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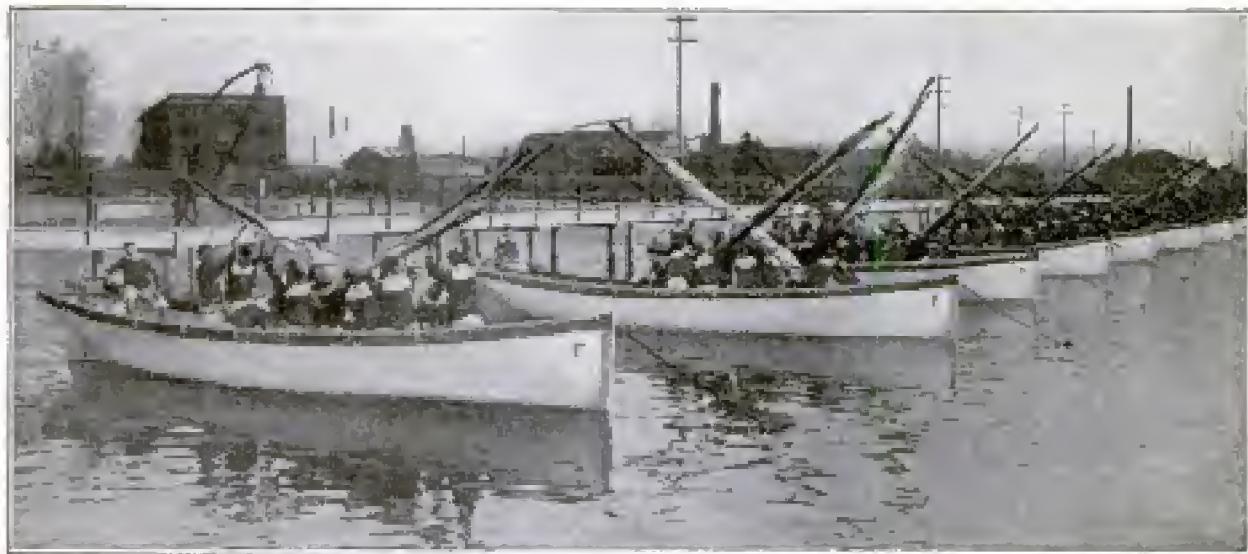
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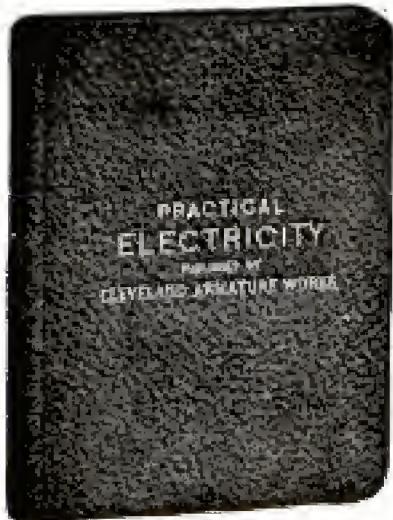
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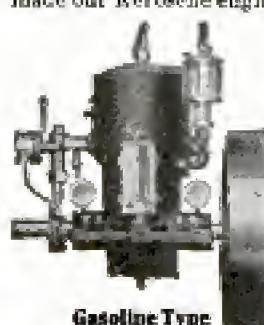
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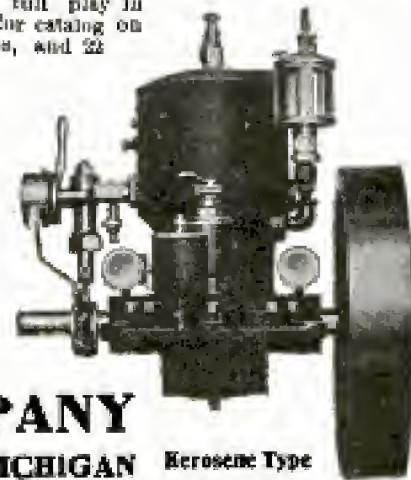
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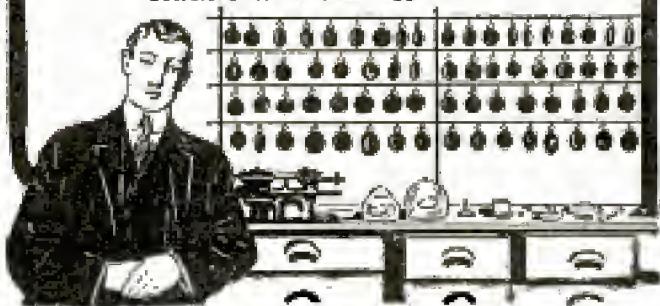
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CHARLES E. ELLIS.

## THE STORY OF KORNIT

*By President CHARLES E. ELLIS*

KORNIT was invented by JOHANN GUSTAV BIERICH, a subject of the Czar of Russia, residing at Menkenhof, near Llievenhof, Russia, and is a homogeneous Horn or Hoof substance. Kornit is produced by grinding horn and hoof shavings and waste into a palatable powder and then pressing under heavy hydraulic pressure with heat into a homogeneous slab. This slab produces a substance which can be sawed or turned the same as ordinary wood. It is of a beautiful black consistency and is EXTREMELY VALUABLE as a NON-CONDUCTOR FOR ELECTRICAL SUPPLIES. It is a matter of record that the electrical industry in this country AT THIS TIME DOES NOT HAVE a satisfactory material for heavy or high insulating purposes. A slab of Kornit one inch thick was tested in Trenton, New Jersey, by the Imperial Porcelain Works and was FOUND TO HAVE RESISTED 96,000 VOLTS OF ELECTRICITY. It may be interesting to note here that the heaviest voltage which is transmitted in this country is between Niagara, Buffalo and Lockport, New York. The voltage transmitted by this com-

pany is between 40,000 and 50,000 volts. Kornit is equally as good as a non-conductor for electrical purposes and supplies as is hard rubber.

The average price of hard vulcanized rubber for electrical purposes is today considerably over one dollar per pound—at the present writing something like \$1.25 per pound. KORNIT CAN BE SOLD AT TWENTY-FIVE CENTS PER POUND, and AN ENORMOUS profit can be made at this price, so that it CAN EASILY BE SEEN that where Kornit is EQUAL AS GOOD and AS A MATTER OF FACT, in many instances, a BETTER non-conductor than hard rubber, it can compete in every case where it can be used with great success on account of its price. For electrical panel boards, switchboards, fuse boxes, cutouts, etc., there are other materials used, such as vulcanized paper fibre, slate, marble, etc. A piece of vulcanized paper fibre 3x11 inch in lots of 1,000 brings 20 cents per piece. A piece of KORNIT of the SAME DIMENSIONS could be sold with the ENORMOUS PROFIT OF OVER 100 PER CENT at ten cents. The absorptive qualities of Kornit render it such that IT IS FAR PREFERABLE to that of vulcanized fibre. It will not maintain a flame. Of all the materials which are now in the electrical market for supplies and insulators there is, as we

have stated above, none that are satisfactory. Kornit will fill this place. Its tensile strength per square inch averages from 1,358 pounds to 1,811 pounds, which the reader can readily see IS MORE THAN SATISFACTORY. This test was made by a well-known electrical engineer, who is now acting in that capacity for the United States Government, with a Standard Bethle Bros. Testing Machine.

Waste horn and whole hoofs are being sold by the ton today principally only for fertilizing purposes. There is one town alone, Leominster, Mass., where they have an average of eight tons of horn shavings every day. These waste horn shavings are now only being sold for fertilizing material. These eight tons of horn shavings manufactured into Kornit and sold for electrical purposes would easily bring \$3,000. At this price it would be

tons, door handles, umbrella, cane, knife and fork handles, brush and sword handles, revolver handles, mirror backs, picture frames, toilet accessories, such as fancy glove boxes, jewel cases, glove stretchers, shoe lifts, etc.; office utensils such as paper knives and pen-holders, ink stands, pen racks, medical instruments such as syringes, ear trumpets, etc., etc.; pieces for games, such as draughts, chessmen, dominoes, checkers, counters, chips, cribbage boards, etc.; telephone ear pieces, stands, etc.; piano keys, typewriter keys, adding machine and cash register keys, tea trays, ash trays, scoops, mustard and other spoons, salad sets, cigar and cigarette cases, cigar and cigarette holders, match boxes, automobile supplies and hundreds of other useful and ornamental articles, all at a large and remunerative profit.

## The Great Demand for Kornit in this Country

HERE is one manufacturer ALONE here in New York that uses 60,000 square feet of insulating material for panel boards every year. He is now using slate and marble, but IT IS NOT SATISFACTORY, for the reason that in boring and transportation IT BREAKS SO EASILY. KORNIT WILL ANSWER THE PURPOSE OF MANUFACTURING PANEL BOARDS VERY MUCH MORE SATISFACTORILY. On 60,000 square feet of Kornit there would be a net profit of over \$30,000, or 50 cents for every square foot used. THIS ONE EXAMPLE is cited to show you THE ENORMOUS PROFITS which can be made. There are a great many other panel and switchboard manufacturers in this country. You may be interested to know that a panel board is a small switchboard. There is one or more on every floor of all large buildings where electricity is used. They each have a number of switches mounted on them, so that those in charge can turn certain lights on or off, and by these panel boards all the electrical power in the building is controlled. They must be of a reliable non-conducting material. Kornit can be used for this purpose almost exclusively. The largest electrical manufacturing concerns in Riga, Russia, ARE USING KORNIT FOR THIS PURPOSE, after having tried all other so-called non-conducting compositions. The electrical trades alone can consume a great many tons of Kornit every day in the year. If only two tons of Kornit is manufactured and sold every working day in the year IT WILL ENABLE THE KORNIT MANUFACTURING COMPANY TO PAY 16 PER CENT. DIVIDENDS EVERY YEAR. Of course, if four tons a day are sold the dividends would be 32 per cent. per year. THIS IS NOT IMPROBABLE. AN EXPERT ELECTRICAL ENGINEER who holds one of the most responsible positions here in New York City made the statement, after thoroughly examining and testing Kornit for electrical purposes, that in his most conservative estimation there can be ten tons of manufactured Kornit sold every working day in the



MR. JOHANN GUSTAV BIERLICH, THE INVENTOR OF KORNIT, IN HIS SUMMER GARDEN AT MENKENHOF, RUSSIA.

selling for less than one-fifth of what hard rubber would cost, and about one-half what other competitive materials would sell for, even though they would not be as satisfactory as Kornit.

Kornit has been in use in Russia about five years. In Riga, Russia, which is the largest seaport town of Western Russia, the Electrical Unions there are using Kornit with the greatest satisfaction, finding it preferable to any other insulating material.

The expense of manufacturing Kornit from the horn shavings is not large, as the patentee, Mr. Bierlich, has invented an economical and satisfactory process which produces an article that in the near future will be used in the construction of almost every building in this country.

Besides electrical insulators, Kornit can be used for the manufacturing of furniture, but-

first year. This would mean that the Kornit Manufacturing Company would pay a dividend out of its earnings the first year of over seventy-five per cent (75%). This is probably more than will be paid the first year. But there certainly seems to be a good prospect of paying a large dividend within one year from today.

**THERE WILL BE SUCH AN ENORMOUS DEMAND FOR KORNIT AFTER IT BECOMES INTRODUCED THAT FROM YEAR TO YEAR THE DIVIDENDS EARNED WILL BECOME LARGER AND LARGER. THIS IS THE BEST OPPORTUNITY TO MAKE AN INVESTMENT THAT YOU HAVE EVER HAD.**

It is a well-known fact that THE MOST LEGITIMATE and PROFITABLE way to MAKE MONEY is by manufacturing some product that is "NECESSARY" and ONE

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**O**N March 1, 1907, our Factory, which had just been thoroughly equipped and completed, was burned to the ground!

Since that time we have purchased the Real-Estate and have completed OUR OWN Factory. It was finished and in complete working order on the 15th of last month (May). We have purchased the land and erected the building for which we paid cash. All of the machinery is paid for. Money is now needed to establish sales depots. After this money is obtained there will not be any shares sold at the present price.

A few shares obtained now may be the foundation for a fortune or the much-desired income for support in the unknown years that



NEW KORNIT FACTORY, NEWARK (BELLEVILLE STATION), N. J.

THAT CAN BE FULLY CONTROLLED so that nobody else can manufacture the same article. Look at Sugar (which is protected by a high tariff); at Standard Oil, the Telephone, the Telegraph, and we might go on and enumerate many more monopolies. THEY ARE THE BIG MONEY MAKERS OF TODAY. KORNIT CANNOT BE MANUFACTURED BY ANYBODY IN THIS COUNTRY EXCEPT OURSELVES OR OUR AGENTS. We own all the patents issued by the UNITED STATES GOVERNMENT to the Inventor, MR. JOHANN GUSTAV BIERBICH, IN RUSSIA. These patents HAVE BEEN BOUGHT from Mr. Bierbich, and ARE DULY TRANSFERRED TO THE KORNIT MANUFACTURING COMPANY and the same is DULY RECORDED IN THE PATENT OFFICE OF THE UNITED STATES.

are to come. We leave it to you if it would not seem good judgment to take immediate advantage of this opportunity. Anyway, please write to me at once and let me know just what you will do. If it is not possible for you to take shares now, write me and tell me how many you would like and how soon it will be convenient for you to do so, provided I will reserve them for you. As soon as I receive your letter I will answer it WITH A PERSONAL LETTER AND WILL ARRANGE MATTERS AS YOU WISH TO THE BEST OF MY ABILITY.

REMEMBER, I HAVE A GREAT MANY THOUSAND DOLLARS INVESTED IN THE KORNIT MANUFACTURING COMPANY, and the minute you buy a share or more in this Company we become CO-PARTNERS as CO-SHAREHOLDERS. It is for our mutual bene-

fit to watch and guard each other's interests. I WILL BE GRATEFUL IF YOU WILL WRITE ME TODAY, so that I may know just what you will do.

I know you will agree with me that you have never had presented to your notice a better opportunity to make an investment where such large profits can be made because of the exclusiveness of control and the great demand and the low cost of the raw material, which is now almost practically thrown away. Join me in this investment, and I assure you that it is my sincere belief that in the near future you will say, "That is the day I made the most successful move in my whole life."

## My Offer to You While It Lasts

THE KORNIT MANUFACTURING COMPANY is incorporated under the laws of New Jersey, and is capitalized with \$50,000 fully paid non-assessable shares at \$10 each. It is my intention at this time to sell only a limited number of these shares at the par value of \$10 each. We have paid cash for our Factory and all of the machinery, which was in the majority of cases built to our special order. It is now necessary for us to establish sales depots all over this country. This will take quite a considerable sum of money. And this is the reason I am willing to sell these shares at their par value. In my opinion they are worth much more and just as soon as our sales departments are in good working order not a share will be sold at this price. Now is the time to get into this concern, which has already spent thousands of dollars in Land, Factory Building and Machinery. You will get quick results. Every dollar which the Kornit Manufacturing Company receives from the sales of these shares will be put into the treasury of the company and used for development purposes. Ten dollars will buy one share. Twenty dollars will buy two shares. Fifty dollars will buy five shares. One hundred dollars will buy ten shares. One thousand dollars will buy one hundred shares, and so on. After you have bought one or more shares in the Kornit Manufacturing Company you may feel, as I do, that you have placed your savings where they will draw regular and satisfactory large dividends.

I should not be a bit surprised if these shares paid dividends as high as one hundred per cent in the not far distant future. Consequently, a few dollars invested now in the shares of the Kornit Manufacturing Company will enable you in the future to draw a regular income from the large profits of the Company as they are earned. The dividends will be paid semi-annually, every six months, the first of May and November of each year. This is one of the best opportunities you will ever have presented to you in your whole lifetime. I have invested a great many thousand dollars in the Kornit Manufacturing Company, and I feel sure it is one of the best investments I have ever made. I can truthfully say to you

that I fully believe that you will be more than pleased with your investment and that you will never be sorry. Remember, that you have here an opportunity to become interested in a large industrial manufacturing concern manufacturing a product with an exclusive monopoly, which has never before been manufactured or sold in this country.

Remember, that it is by no means an experiment, as it has been successfully manufactured and sold for over four years in Russia at a large profit, and the manufacturer and inventor recently wrote that the demand is increasing every day beyond the capacity of their manufacturing facilities.

Now is the time for you to take advantage of this magnificent opportunity to make an investment in these shares. I EARNESTLY BELIEVE that in a few years THESE SHARES WILL BE WORTH FROM FIFTY DOLLARS TO ONE HUNDRED DOLLARS each on account of THE LARGE DIVIDENDS which the company will earn and regularly pay each and every six months. It is a well-known fact that shares that pay fifty (50) to one hundred (100) per cent dividends will readily sell in the open market for \$50 to \$100. THE OUTLOOK FOR THE KORNIT MANUFACTURING COMPANY is such that it seems impossible for the earnings to fall far short of these figures. If the company only makes and sells two tons of Kornit a day for the first year and made a profit of only \$200 per ton it would mean a profit of over sixteen per cent (16%) the first year. If this business were doubled the second year, of course the earning capacity would double and the dividends would be over thirty-two per cent (32%). Prominent and well-known Electrical Engineers assure me that this product cannot help and is bound to make enormous profits. I would recommend that you send for as many shares as you wish at once. You, in my conservative opinion, can safely count on the large earning capacity of these shares. I will at once write you a personal letter with full information, and send you our illustrated book, "A Financial Opportunity," containing a score of photographs of the Kornit industry, taken in Russia. Please let me hear from you.

Yours very truly,

**CHARLES E. ELLIS**

607A West 43rd St., New York City, N. Y.

Mr. Ellis, besides being President of this company, is also President of two other large and successful companies, owning shares therein valued conservatively at over \$250,000. Mr. Ellis has other investments in New York City real estate, bonds, stocks and mortgages to the amount of hundreds of thousands of dollars. Any bank or mercantile agency will tell you his guarantee is as good as gold. This is the successful man who wishes you for a Co-partner as a Shareholder and Dividend Receiver in his company. Remember, you will do business personally with Mr. Ellis in this matter.

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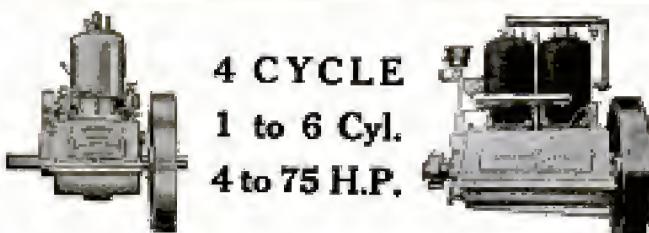
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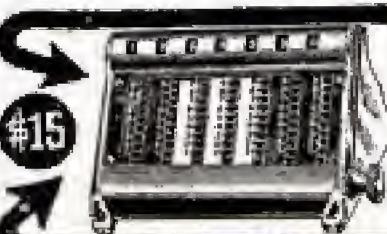


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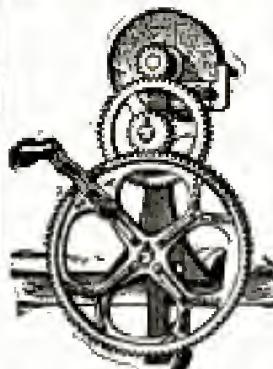
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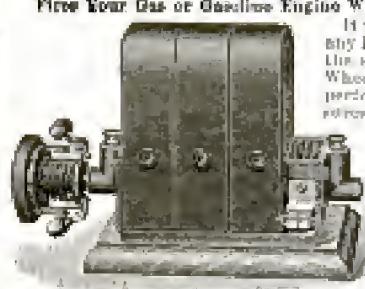
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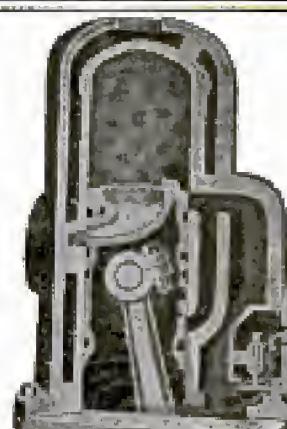
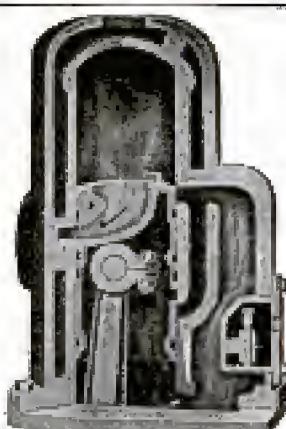
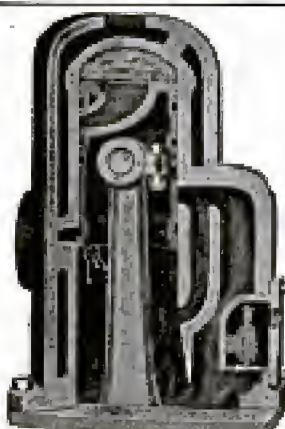


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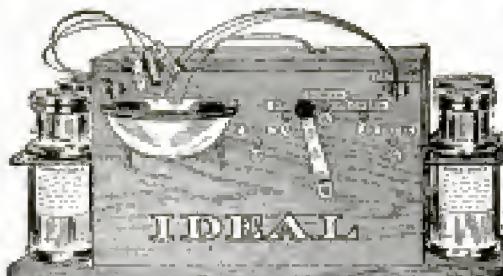
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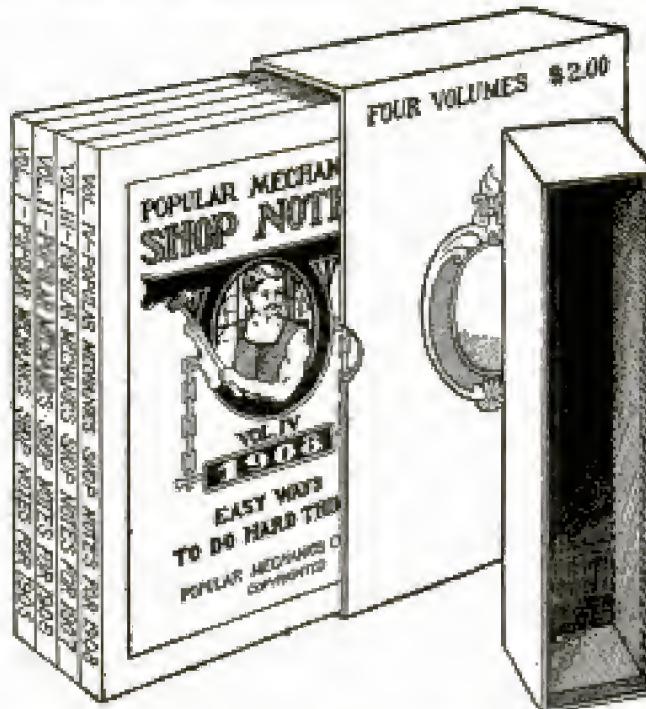
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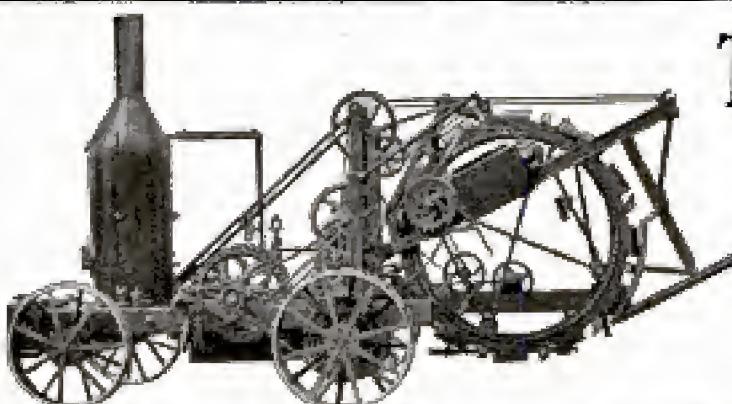
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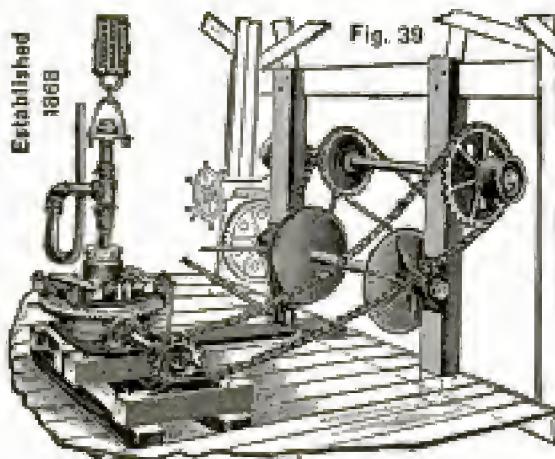
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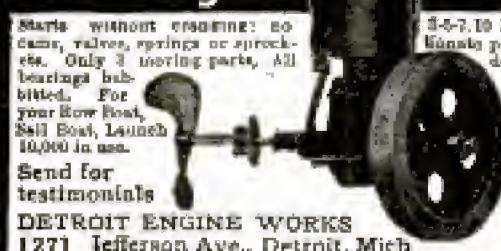
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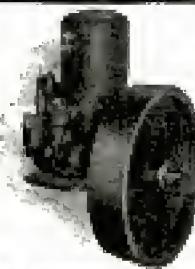
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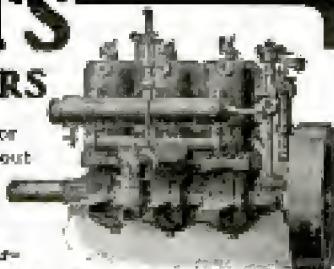
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**FOR SALE OR EXCHANGE**—Martin Sheep-Shearing machine, new; 1½-hp. stationary gasoline engine; small steam engine, boiler, etc. Want small marine engine. A. W. English, Wyoena, Wis.

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**FOR SALE OR EXCHANGE**—First class telegraph instrument, for model engine or anything useful. Herman Fasel, 102 N. Monroe Ave., Green Bay, Wis.

**FOR SALE OR TRADE**—One complete Electro-Plating outfit with tubs. Also one complete Metal Plating outfit in good condition. Will sell, or trade for Motorcycle. Alfred Eggett, Greenwood, Wis.

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**WORK done in and out of town.** Patterns and models made of all descriptions. Wm. C. Keuth, 80 W. Washington St., Chicago, Ill.

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GRAMAPHONE, 2,500 models, for offers. A. Messet, Flat 2, 611 W. Erie St., Chicago, Ill.

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PLAIN AND LODGE emblem key checks. Name, number of lodge and address stamped on. Price 25 cents. Herbert Goss, 340 Logan St., Lewistown, Pa.

HOW? WE'LL SHOW YOU. How to Clean Tracings; Make Blueprint Paper; Make Drawing Paper Transparent; Find the Expansion of Metals; Weight of Metals; Temperature of Metals; Size and Speed of Pulleys; Make Paste for Labels on Glass or Metal; Make Low Fusing Solder; Solder for Aluminum; Make Leather or Belt Dressing Filler for Holes in Wood, and anything else you want to know. Send 10c in stamp or silver to Patent Bureau, 1315 Marquette Bldg., Chicago, Ill.

MARRY WHO? "YOUR IDEAL." Ask for our good and sensible plan. L. Box 190, Dept. 6, Lestershire, N. Y.

WANTED—Printing press, 6x9 or larger, type, etc. Box 122, Olneyville, R. I.

LUMINOUS PHOTOGRAPHS that glow in the dark; dry mounting tissue; paper negatives. Easily and cheaply made. Directions, anyone, 10c; all three, 25c. Gen. Hostetter, 1915 N. Ninth, Terre Haute, Ind.

PRINTING—100 envelopes, 50c postpaid; 100 packet or billheads, 50c; 100 business cards, 25c. Send stamp for catalog PM. Joe C. Patterson, Princeton, Ind.

\$100.00 A MONTH simply mailing post cards from your own home in leisure hours. Complete plan sent postpaid for 25 cents (silver). Send today and address M. Verkin, 1922 Mil., Galveston, Tex.

ORGANISTS, keep your organs in first-class condition. Important questions answered by mail with drawings. Includes tuning, voicing, repairing, blowing installations, advice to purchasers, \$1 to \$3. Saves tremendous expense. National Organ Information Bureau, Dallas, Tex.

ELECTRICIANS AND EXPERIMENTERS can make Transformers to reduce 110 volts A. C. to 10, 20, 30 or 40 volts. My set of six drawings show how. Price 50c. W. C. Geiz, 646 N. Fulton Ave., Baltimore, Md.

Please Mention Popular Mechanics

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**MAKE MONEY; INVESTMENT SAFE.** If you have a few dollars or a few hundred dollars, our booklet, which we mail you free on request, will show you how and where you can secure a safe, sure and good-paying investment, at very low prices; the men connected with our enterprise will satisfy you of its safety. Write today. B. M. & D. Co., Benton, Wis.

**STILL SELLING** complete working drawings of S-latch screw-cutting, foot-power lathe for \$1. I now have castings. Price on application. W. E. Morey, 2503 Fulton St., Chicago, Ill.

**ONE PRINTING PRESS.** Seventeen fonts type. Walter Oldham, Atchison, Kan.

**EVERY MAN IN EVERY WALK OF LIFE** should wear a suspender. Hammock Sanitary Suspender has no under straps to chafe. Price, complete with two detachable, washable socks, silk, \$1; mercerized, 75c; cotton, 50c. Large, medium, small. Write for booklet. Hygienic Appliance Co., Inc., Box 231, Chicago.

**KWITTEK 1400 B.W.U. B.Y.** Thirty-two page book on rapid calculations. Free. Only book of the kind. Get one. One dime, mailing charges. F. Malone, Figure Expert, 40 Mills Bldg., St. Louis, Mo.

**\$1.00 PER 100 PAID** for mailing or distributing circulars. Steady work. Particulars, 4 cents. R. F. Klyman Co., Newton, Iowa.

**MECHANICAL IDEAS** put in selling shape. Complete working drawings made. Bids on manufacture secured. Every detail perfected up to the manufacturing and selling stage. Chicago Engineering Company, 184 La Salle St., Chicago.

**GOLD DREDGING IN ALASKA.** 10,000 acres tested gold-bearing gravel. Richest places known. Stock, 25 cents; per \$1. Instalments. Should pay \$10 for every dollar invested. Illustrated prospectus free. Yukon Basin Gold Dredging Co., Dept. 76, Kansas City, Mo.

**HANDCUFF MYSTERIES.** The true and correct method of escaping from handcuffs fully explained. I will also send the great secret of opening padlocks without keys, \$1 prepaid. Joe Meltonough, 2010 Eighth Ave., Altamont, Pa.

**COOK WITHOUT FIRE.** You can save 15 per cent of your time, labor and fuel with the Simplex Wireless Cooker. Pays its cost in one day's time. Costs only a few cents. Particulars, 4 cents. R. F. Klyman Co., Newton, Iowa.

**WE ARE DESIGNERS AND BUILDERS** of special automatic machines. It will cost you nothing to secure an estimate or advice. Main 1554. The Bell & Howell Co., 88 Illinois St., Chicago.

**ADAIR BOOK STORE**, 43 E. Van Buren St., Chicago, Ill. Catalog mailed free. Write for it.

**OFFER FEW SMITH PREMIER TYPEWRITERS.** Condition and appearance perfect, \$25 each. Trial allowed. Executor, Box 105, Waterford, N. Y.

**MONEY BACK** if Will's Spot Soap fails to remove grease spots from clothing. 25c. W. P. Will, Georgetown, Ill. (Agents write me.)

**AGENTS** make big money selling our new sign letters for office windows, store fronts and glass signs. Anyone can put them on. Write today for free sample and full particulars. Metalite Sign Letter Co., 71 N. Clark St., Chicago.

**\$250.00 MONTHLY** easily made fitting eyeglasses. Short, thorough course by mail. Easily learned. Diploma. Big demand for opticians. We start you. Free "Booklet 4" tells how. National Optical College, St. Louis.

**AGENTS WANTED** in every county to sell the Transparent Handle Pocket Knife. Big commission paid. From \$75 to \$300 a month can be made. Write for terms. Novelty Cutlery Co., No. 67 Bar St., Canton, Ohio.

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**AGENTS CAN MAKE \$10 PER DAY** setting our polished gold and silver letters for office windows, store fronts and glass signs. Anyone can study these letters by following directions sent with each order. Write for our 8-page illustrated circular, S. H. Parrish & Co., Clark and Adams Sts., Chicago.

**\$100 PER MONTH SALARY**—Paid weekly. Energetic man in each county to represent Hardware Dept. Established business. Expense money in advance. The Columbia House, 11-7, Chicago.

**AGENTS' MONEY-MAKER**—Sell the "Eureka Door Knob Bell," patented. New bronze metal, anyone can put on. Write for agency and sample. F. B. Black Co., Kansas City, Mo.

**MEDALLIONS SOLD AT SIGHT.** 300% to 500% profit. Make up your own goods and be independent. "It's easy." Catalog free. Fred Resig Co., 306 W. Randolph St., Chicago.

**COKING WITHOUT FIRE.** You can save 75% of your time, labor and fuel with the Simplex Wireless Cooker. It pays its cost in one day's use; costs only a few cents. Particulars, 4c. R. F. Klyman Co., Newton, Iowa.

**LATEST HAIRCUTTING DEVICE.** Aluminum Automobile Combs, 25c. Child can operate. Hodge Mfg. Co., East Berlin, N. Y.

**HAVE YOU WRITTEN SONG-POEMS?** Or composed original music that you can't arrange. I will compose excellent music for your poem or arrange your music for publication. Piano, orchestra, organ or voice arrangements. First-class, honest, expert work. G. W. Ashley, 67 Clark St., Chicago.

**ANYBODY CAN MAKE GOOD CUTS** with my simple zinc etching process; price, \$1; specimens and particulars for stamp. T. M. Day, Box M, Windfall, Ind.

**THE "BUY-YOUR-BOOKS-BY-MAIL" AGENCY.** Room 617 U. S. Express Bldg., Chicago. Note—Our specialty—the books you want but can't get in your home town. "If it's in print we'll get it for you." Write us for any desired book. We want your book business. We have all the new novels, and also all the new and old scientific works. Address as above.

**MAKE YOUR OWN FURNITURE** from our full size patterns. New plan. Simple and easy. Send ten cents for sample pattern of bookcase or candlestick, and illustrated catalog showing other pieces. The Home Furniture Pattern Co., 2016 First National Bank Building, Birmingham, Ala.

**AM MAKING \$8.00 to \$20.00** weekly at home, evenings. Honest, dignified business proposition, easily handled by anyone. No mail-order scheme. Particulars, 50c; worth \$25.00 to any live person. Have nothing to sell you. Box 105, Waterford, N. Y.

**DOMESTIC ICE MACHINE.** Make ice at home for self and others; cheap, practical process; complete directions, 50c. Make Mission Furniture; you can, from large, life-painted designs; details, directions, 50c; no stamp. Farms Co., Pittsburg, Pa.

## TOO LATE TO CLASSIFY.

Ads to appear in this section in Aug. issue will be received as late as July 8. Ads to be placed under desired classified head must reach this office not later than July 1st.

**PUZZLES**—We have the largest variety in the world. Catalog for stamp. Ewing's, 100 Thatcher Place, Decatur, Ill.

**FOR SALE**—Beautiful resort lot, 50x200 ft., at Bass Lake, Mich. Grand well, boating, fishing, etc. Private bargain for \$100; worth double. Particulars, Mrs. G. Hess, 2745 Princeton Ave., Chicago.

**PRACTICAL MONEY MAKING FORMULAS** of every description, promptly by mail, 10c each. State exact requirement. Vanderveer Reference Bureau, P. O. Station Vanderveer, Brooklyn, N. Y.

**PANORAMIC PHOTOGRAPH**, five by twenty-five inches, of Tulsa, second largest city in Oklahoma. Beautiful, unique and interesting. Everybody should have this picture of the railroad center of Oklahoma. Photographers can get pictures off this picture. Only fifty cents. Challiss Donald, Tulsa, Okla.

**FORMULA FOR "SEAMO"** welding compound, 30c. Formula for "Seamo" brazing compound, 30c. Both for 50c. No stamp, please. Full directions. P. Seaberg, 1496 Newport Ave., Chicago.

**GET YOUR GAS AND ELECTRIC FIXTURES** at wholesale prices, and save big money. Put them up yourself and save more money—it's easy. Or get your local gas fitter or electrician to put them up for you, and still save good money. Write for our catalogue sheets and see. State whether you want gas only, or combination gas and electric fixtures. Western Chandelier Co., Mail Order Department, 19 West Lake St., Chicago.

**FOR SALE, CHEAP**—Engines, boilers, pumps, heaters, air compressors, blowers, fans, laundry machinery. From one bargain that you can supply your wants no matter what they are. A. L. Dawson, 48 S. Jefferson St., Chicago.

## LEARN WATCHMAKING

Refined, profitable labor—Competent men always in demand. We teach it thoroughly in as many months as it formerly took years. Does away with tedious apprenticeship. Money earned while studying. Positions secured. Send for catalog.

**ST. LOUIS WATCHMAKING SCHOOL, ST. LOUIS, MO.**



## Here's YOUR Chance

Young man: **YOU!**

Don't think for a minute that training isn't essential to success—*For it is.*

The trained man is always sure of a good paying position and rapid promotion, while the untrained man plods away at some little job where the pay is small, the work menial, and advancement (if any) very, very slow.

Are you trained? Can you do some one thing well? Are you paid for what you know? If not—*Here's your chance:*

The International Correspondence Schools, *the greatest man-helping institution in the world*, were organized solely to help poorly-paid, but ambitious men, *such as you*.

I. C. S. training enables the man with little schooling to take a position in the front rank. It helps the dissatisfied man to secure a more congenial position. It brings better salary to the man who is poorly paid. In other words, it makes men *successful*.

Where you live makes no difference; neither does it matter what you do or what your circumstances; the I. C. S. can reach you, and can help you in *your spare time*, without requiring you to leave home or your present position.

So easy and simple is it all that almost before you are aware of it you are enabled to step up into a position where the pay is good, the work congenial, and, best of all, at the line of work of *your choice*.

The I. C. S. will charge you nothing to tell you about it. Just mark the coupon as directed and mail it to-day. You must take the first step.

**The Business of This Place is to Raise Salaries.**

Every month there is an average of 300 men who voluntarily report salary increases and better positions as a direct result of I. C. S. training.

Here is *your chance*. Here is the coupon.

**ACT TO-DAY!**

### INTERNATIONAL CORRESPONDENCE SCHOOLS Box 872, Scranton, Pa.

Please explain, without further obligation on my part, how I can qualify for a larger salary in the position before which I have marked **X**.

Bookkeeper  
Stenographer  
Advertisement Writer  
Show Card Writer  
Window Trimmer  
Commercial Law  
Illustrator  
Civil Service  
Chemist  
Textile Mill Sup't  
Electrical  
Elec. Engineer

Architect  
Telephone Engineer  
Elec. Lighting Inst.  
Mechan. Engineer  
Surveyor  
Stationary Engineer  
Civil Engineer  
Building Contractor  
Cobble'd Driveman  
Architect  
Structural Engineer  
Bridge Engineer  
Mining Engineer

Name \_\_\_\_\_

Street and No. \_\_\_\_\_

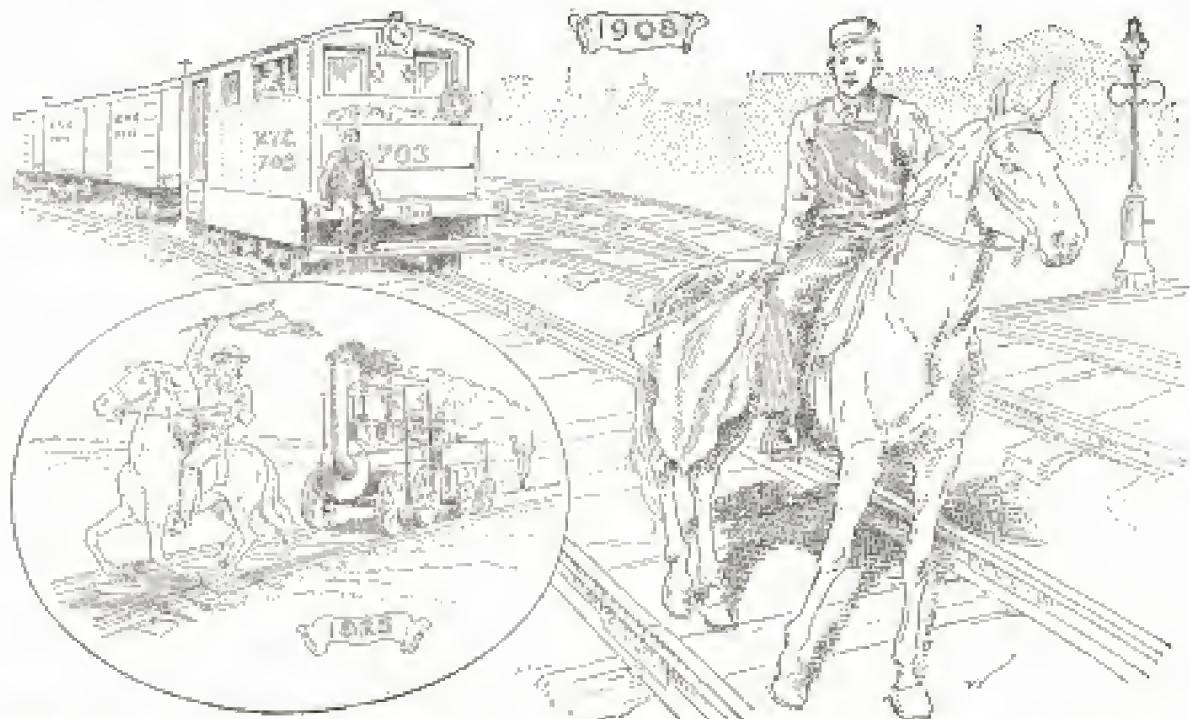
City. \_\_\_\_\_ State. \_\_\_\_\_

# POPULAR MECHANICS

Vol. 10.

JULY, 1908

No. 7.



## MOUNTED TRAIN FLAGMEN OF THE PAST AND PRESENT      THE MARKSMANSHIP OF AMERICAN GUNNERS

When the first passenger train in England took its trial spin along the tracks of the Stockton & Darlington railway in 1825, a horseman, bearing a red danger flag, galloped along just ahead of the engine to warn the crowds of spectators, and to act as part of what was intended as a railway pageant.

On the New York Central railway in New York City is found just such a flagman at the present day, but his duty is only to warn persons, not to act as part of a parade. The difference in the general appearance of each and the flags they carry attest to this. Every day a certain amount of switching has to be done on the tracks below Thirtieth street. A dummy engine burning hard coal is used, and as it moves slowly along Tenth avenue it is preceded by a man on horseback, carrying a red flag.

"Fighting Bob" Evans, no longer fighting, but peaceful, made the statement soon after his last leave from the fleet he so successfully brought to its destination after the long trip around South America, that the straight shooting made by the gunners under his command had shattered all big gun records existent, whether of the American, British, French, German, Japanese, or any other navy.

"If the report is given out," declares "Fighting Bob," "it will cause the most profound sensation in naval and political circles that the world has had for a long time. The record made by the men at the guns was the biggest individual feature of the cruise. Every record heretofore made by gunners has been wiped out. I speak not only of American records, but of records made by all navies."

## MAKING "FAKE" MOVING PICTURES

Many people shudder, when at a moving picture show they see depicted



"Before and After" in One View

upon the canvas screen gruesome scenes in which men are run over by automobiles, or meet death in some

other manner just as horrible. They try to reason out how it is possible for the picture men to get such pictures, but very few realize how simple a juggler's trick the process really is.

In this illustration is shown the making of an automobile accident on one of the boulevards of Paris. The chief actors are an automobile and two men—one legless—made up to look alike. The moving-picture men take a series of pictures of the automobile as it rushes along the road, then it is stopped. The man who enjoys the privilege of four limbs takes his position almost under the wheels, prostrate. One exposure is sufficient for this view, and then the legless man is substituted for his more fortunate companion, and the dummy lower limbs are placed between the wheels. The automobile is again started and exposures taken. It disappears as the legless body drags itself to the edge of the curbing. It is all very realistic in the pictures.

## SEA AIR IN YOUR ROOM OR OFFICE

It is claimed that a recent invention makes it possible to derive all the tonic properties of ozone, the element that people go to the seashore to inhale, by merely making connection with the electric light circuit. When thus connected the machine is supposed to generate ozone in any quantity desired. It is inhaled by means of a glass mouthpiece.

The many properties claimed for ozone include the power to sterilize the blood, load the cells with oxygen, destroy the germs of disease and neutralize the toxins they have produced. The machine, in a word is said to produce in concentrated form the beneficial effects of a trip to the seashore without the neces-

sity for the packing of trunks, a wearisome journey and a prolonged period of idleness.



Method of Inhaling the Ozone

This last paragraph is just as the contributor presented it to us, and we are compelled to notice that along with

the elimination of the packing of trunks and the wearisome journey is also the elimination of the joy of the open air, the healthy tan, and the amusements and freedom from care that usually attend a trip after ozone, none of which can be compensated for by a box of electrically generated sea air. Nor is it absolutely necessary that the "prolonged period of idleness" be considered as a prison sentence.

• • •

### HUMAN TEETH AS SIDEWALK MATERIAL

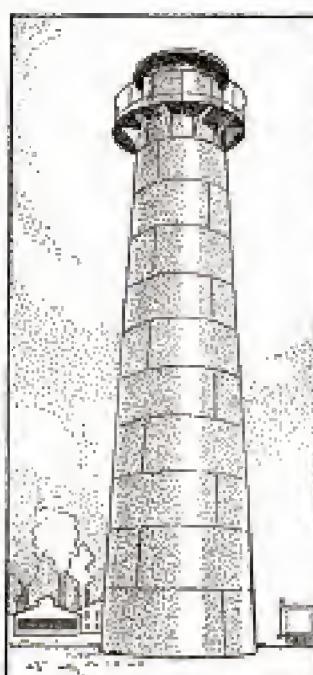
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A report from Altoona, Pa., states that Dr. John Kinsel, a dentist in that city, is building a concrete sidewalk studded with the teeth extracted by him during the past 20 years. Just prior to the commencement of this task, which he is undertaking personally, he completed a perfectly round dwelling, 50 ft. in diameter, and two stories tall, with a cupola. It was constructed of concrete blocks, manufactured by the doctor himself. Concrete Age is responsible for the tooth story.

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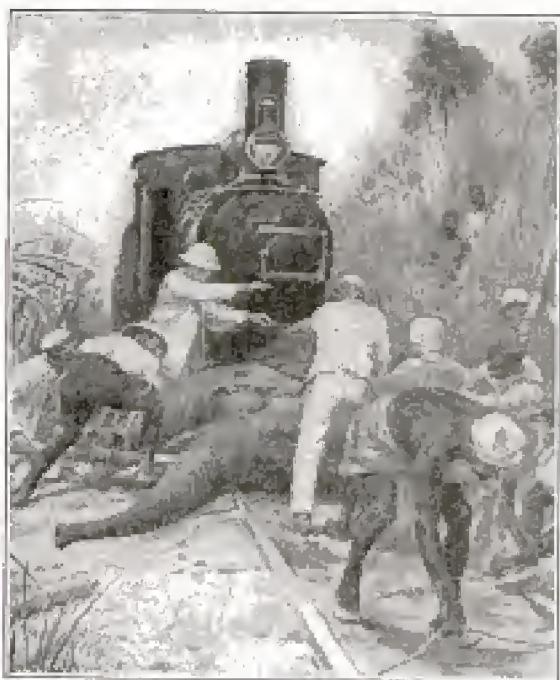
### STEEL LIGHTHOUSE SET UP BEFORE SHIPPING

• • •



and framework numbered for shipment.

The large steel lighthouse which is being placed in position on Cape Campbell, New Zealand, was first erected in the yard of its builder at Thames, New Zealand. As the different parts were made they were put together until the structure loomed 65 ft. above the ground. It was then taken down and the plates



By Courtesy of "The Sphere."

### ELEPHANT KILLED BY JUNGLE RAILWAY

• • •

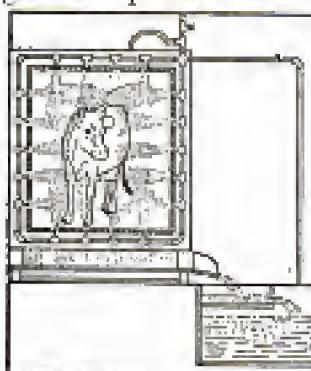
The danger from wild beasts on an African railway is graphically depicted in this illustration. The elephant was one of a herd crossing the Assam-Bengal Railway line in the Nambor forest, never suspecting that something still heavier and more powerful than itself had invaded the primitive jungles. The collision occurred at night, derailing the engine and delaying the train many hours.

• • •

### SHOWER BATH APPARATUS FOR ANIMALS

• • •

A shower-bath apparatus, consisting of a cabinet having open ends and gates to permit an animal to be driven in and out, has been devised by a North Dakota inventor. In the bottom, top and sides of the cabinet is a series of pipes containing perforations through which a liquid solution can be projected. The streams of liquid



strike all parts of the animal at the same time, and with sufficient force to wash the hairy hide from the center of the stream, allowing the liquid to penetrate through the skin.

• • •

### TWO RAILWAY CARS COMBINED ON THREE TRUCKS

• • •

For the past few months two English railway coaches, converted into a twin corridor coach mounted on three 4-wheeled trucks, have been running regularly between London and Edinburgh on through express trains, prov-



The Diver in His Tank

ing the practicability of such a combination.

The conversion was simple. The axle guards, scroll irons and the draw bar and buffing gear at one end of each coach was removed and the headstocks at these ends strengthened by means of 12-in. steel channels, to which were attached brackets lapping one over the other. A bolt passes through the brackets and forms the center pin for a middle 4-wheel truck. Two standard 4-wheel trucks support the other ends of the coaches.

The cars thus transformed from

standard coaches gain immensely in flexibility and in ease of running, as the trucks adapt themselves easily to the sharpest curves.

• • •

### REMARKABLE GERMAN DIVER

The illustration shows two views of a famous German diver doing tricks

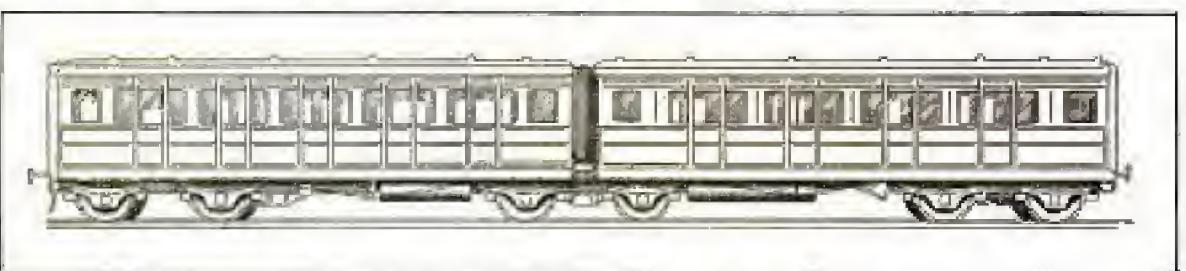


under water in a glass tank on the stage of a Berlin theater. In the first he is drinking water and in the second shooting a rifle while lying down. He recently rescued seven people who were caught in a cavern by an overflow of water.

• • •

### TROLLEY CARS AS MOVING VANS

The express cars of the electric railway line in Lancaster, Pa., are frequently used for moving household effects. When such work is to be done the cars are loaded after midnight, driven to their destination, which must, of course, be on the line, and unloaded before the regular cars start running in the morning.



Two Passenger Cars Running on Only Three Trucks

## TWIN-SCREW GASOLINE LAUNCH

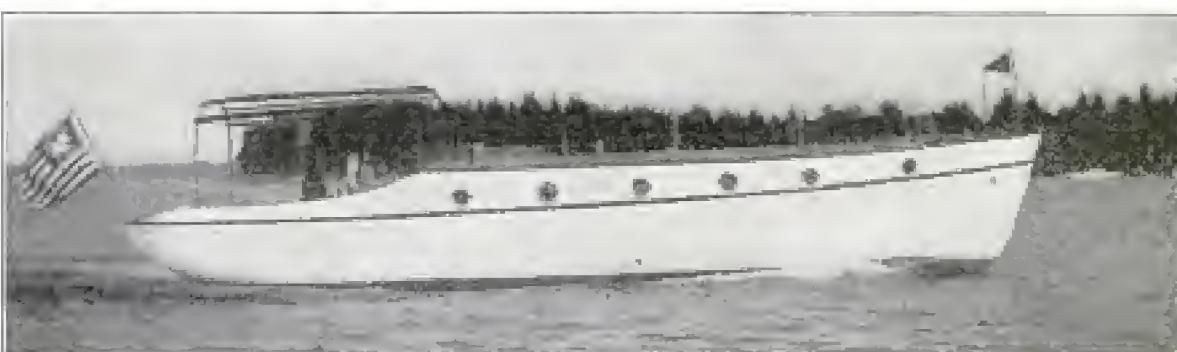


The Twin-Screw Gasoline Launch "Holly"

Courtesy Fred. S. Mock

The "Holly" represents one of the latest types of raised deck cruisers and is driven by twin screws. Her length is 40 ft., beam 10 ft., and draft 2½ ft. Her power comprises two 13-hp. engines, each turning a screw. The maximum speed of the boat is 11 miles an

The "Zenda," which is a 40-ft. hunting cabin launch, is equipped with an 18-hp., 3-cylinder engine which drives it at a maximum speed of 11 miles. She has sleeping accommodations for five persons in addition to the crew. Her interior finish is cypress and mo-



The Hunting Cabin Launch "Zenda"

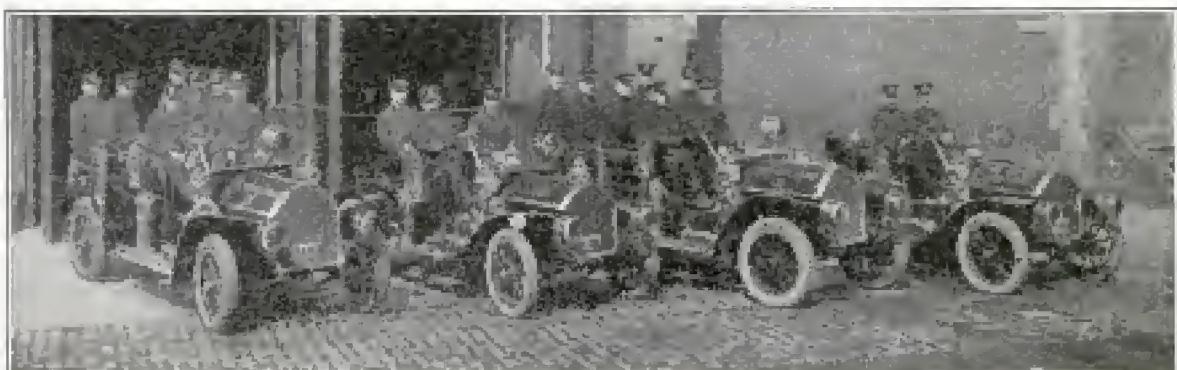
hour. Sleeping accommodations are provided for six persons in addition to the crew.

hogany, and exterior oak and mahogany. She draws 3 ft. of water and has a 9-ft. beam.

## FLYING SQUADRON OF FIRE-FIGHTERS

The flying squadron of the Springfield, Mass., fire department is one of

the most up-to-date fire-fighting battalions in the country. It is composed



of four automobiles, two of which are 40-hp. machines, each carrying 8 men, two 3-gal. chemical extinguishers, two axes, a door-opener, a searchlight and lanterns. Their maximum speed is 45 miles an hour.

The other two automobiles are 30-hp., 3-seated runabouts for the chief and deputy chief of the department, and carry the same equipment as the other machines.

The flying squadron races to a fire ahead of the heavier, horse-drawn trucks, to try and extinguish the blaze before it has gained sufficient headway to necessitate the use of water.

#### COLLECTING VENOM FROM THE GILA MONSTER

For the past year Professor Loeb, of the University of Pennsylvania, has been experimenting with live gila mon-

sters for the purpose of determining the source from which their deadly poison comes. There has been some question as to this, many believing that the poison was formed in the animal's mouth from a bacterial origin. Professor Loeb's experiments prove that the substance is derived from a gland of the lower jaw. The illustration shows the somewhat ticklish task of taking the poison from the gila's mouth.



#### A CALIFORNIA SHIPYARD

A new shipyard has been built at Long Beach, Cal., where ships will take their first dip into the water sideways instead of stern first as is usually the method of launching ocean vessels. The ships will be built on the water side of the scaffolding. Vessels built at Great Lakes' ports are nearly all dropped into the water in this manner.

#### A GOLDFIELD HOUSE

Lumber comes high in Goldfield, and as the miner who built this house had not yet struck "pay dirt," he simply



"A Ticklish Task"



"To Be Continued"

lathed and plastered the walls and moved in. Many of the miners and their families live in tents.

\* \* \*

### THE PRINTING TELEGRAPH MACHINE

A revolution in the sending and receiving of telegraph messages is gradually taking place throughout the United States owing to the telegraph printing machines which are being installed in the metropolitan offices of the telegraph companies.

The make of machine shown in these illustrations has been installed in New York, Chicago, Kansas City, Cincinnati and Cleveland, and, as they can be operated by inexperienced girls, do away with the services of a large number of trained telegraph operators.

In sending, the messages are "punched" or spelled out in the Morse characters on an endless tape. The tape is then fed into a sending machine where a wheel moves it along and in the right direction. The holes in the tape allow contacts to be made which control the receiving mechanism.

The receiving machine is somewhat like an electrically controlled typewriter. Electrical contacts made through the holes in the tape cause the proper type bars to be struck. So fast is this automatic working that the girl operators can receive and send from 200 to 400 messages in 9 hours with one machine. The machines work duplex, two messages being sent at the same time.

### REMOVING SNOW IN ALASKA

When a heavy fall of snow occurs in Valdez, Alaska, the fire department is turned out to clean the sidewalks. They do it with but little exertion and with even less difficulty. A line of

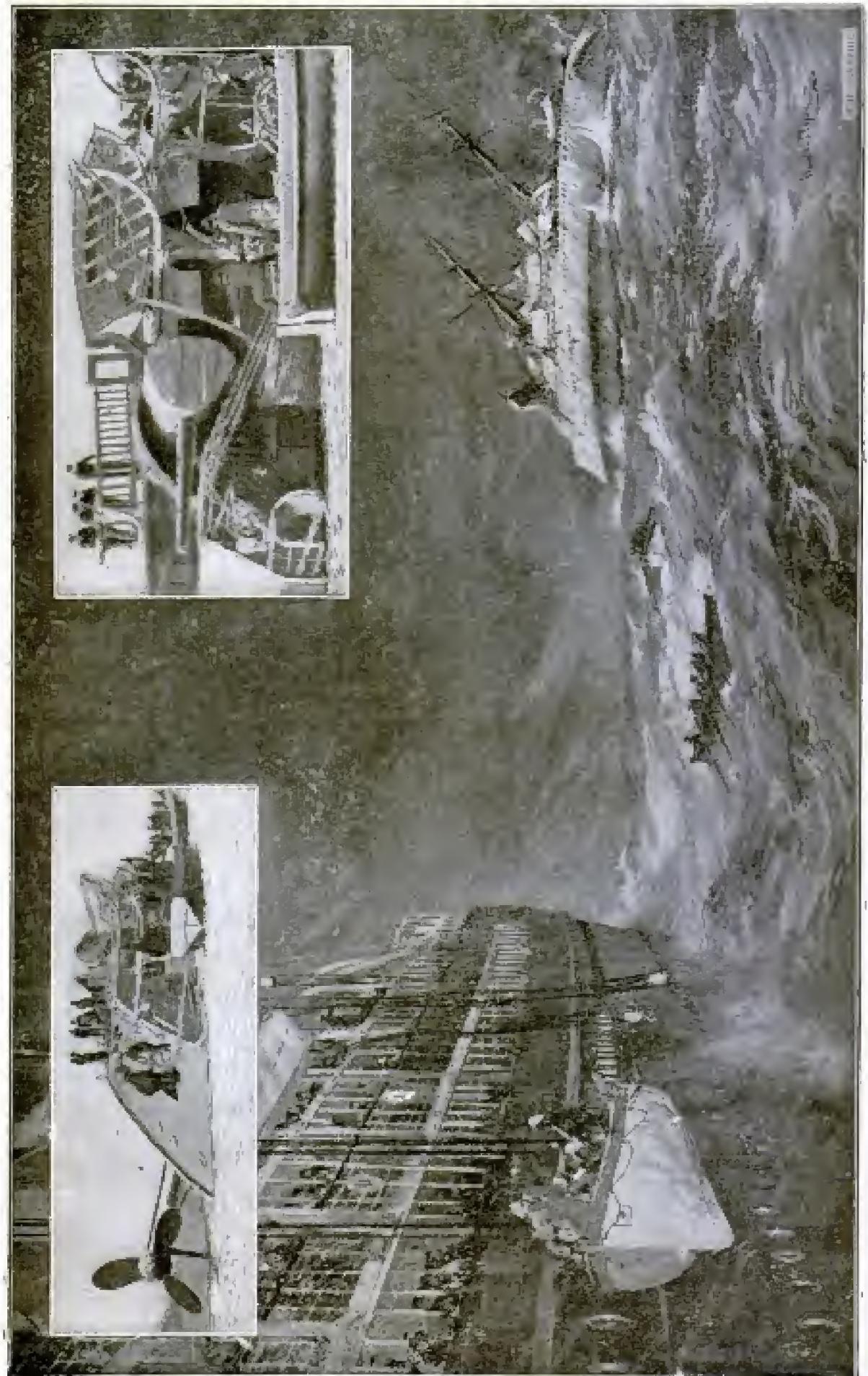


The Alaska Way

hose is attached to a corner hydrant, the nozzle is pointed down the line of sidewalk, and the water turned on. The result is magical and the snow disappears like mist. One illustration shows a near view of the water hitting the snow, and the second the trench it clears.



1.—Punching a Message. 2.—Message Going Through Transmitter. 3.—The Receiving Instrument



## H. M. S. "GLADIATOR" SUNK BY THE "ST. PAUL"

During a blinding snow storm off the Isle of Wight the British cruiser "Gladiator" was run into by the American liner "St. Paul" and beached in a sinking condition. The first lieutenant and 25 of the crew were drowned. The "Gladiator," on her way from Portland to Portsmouth, was steaming slowly through the storm when the bow of the great liner loomed up suddenly through the driving snow. Before the course could be altered she was struck amidships and immediately began to fill. She was headed for the Isle of Wight, where she sank in shallow water. The "St. Paul" immediately backed out of the wreckage and picked up a number of the men swimming about. After standing by for a couple of hours the "St. Paul," whose bow plates were considerably damaged, returned to Southampton for repairs. The scenes following the collision are shown on the opposite page.

## GATHERING SALT ON THE PACIFIC COAST

Nature has done her part in making the task of gathering salt comparatively easy along the Pacific coast. At many points near San Pedro, Cal., are large level tide lands or salt marshes. Around or on those tide lands are built dykes about 2 ft. in height. With high tide, salt water runs into these to a depth of about 15 in. and the sun partially evaporates it. This is repeated day after day until several

inches of salt is deposited on the earth floor. The deposit is scraped and shoveled into long piles or windrows, as shown in the illustration. It is then dumped into cars and taken to the refineries.

## PHOTOGRAPH OF FALLING WALL

This remarkable snapshot was secured just as the wall began to topple over. The mass of brick and mortar



The Falling Wall

narrowly missed burying a dozen firemen and several engines working in the danger zone.



The Stretches of White Are Banks of Salt

## HORTICULTURAL ELECTRICAL EXPERIMENT

The accompanying illustrations show the details of construction of an electrical heater and the use of the same in a hotbed heated by electricity. The experiments were undertaken at Tur-



**The Electric Hotbed**

bine, Ontario, by G. Hartman, the plants being started in the hotbed early in the spring, heated electrically, though the plants were not brought to maturity in the hotbed but planted in the open ground when danger of frost had passed.

The electric heater was placed under a frame 6 ft. wide and 4 ft. long, the floor above the heater being covered with a bed of earth 5 in. deep and the whole frame covered with glass. Iron

wire was used for the heater wound in coils about 2 in. in diameter, the total of about 260 ft. of No. 12 wire being employed. An ordinary 110-volt current was utilized, the electric heat being sufficient to keep the earth warm even in the coldest weather. The coils were mounted on porcelain knobs fastened to a sheet of asbestos cord, all of the coils being connected in series and the entire heater mounted on glass insulators supporting the same at the four corners.

The growth of the flowers and the vegetables was very rapid, the plants being large and well formed and ready for transplanting as soon as the frost is out of the ground.

## RUSTIC ARCHITECTURE

Nothing lends a more artistic effect to a country or suburban residence, whether the estate covers four or five acres or only half an acre, than the construction of rustic summer houses, arbors and benches. If a natural or artificial pond or small lake is present on the property, its beauty is inexpensively enhanced by the filling in of one or more small islands, connected with rustic bridges.

In these illustrations are shown two examples of rustic work and an artificial stone cavern in which a running spring is located. The little rustic shelter and the two-story summer house are always cool and inviting during the summer weeks.



**Suggestions for Small City Parks**

## PHOTOGRAPHED AS SPHINXES AND MUMMIES



The Original Idea of a Photographer in Egypt

The newest thing in freak photography in Egypt is posing for photographs in cardboard sphinx molds and mummy cases. A hole is left where the inscrutable face of the sphinx should be, and more impressionable American and English faces peer out from this vantage upon the photographer. Exceptionally live mummy effects are made in the same way.

## MODERN SEVEN-LEAGUE BOOTS

A walking invention known as the "curved shoe" has made its appearance in Germany and is rapidly becoming the rage. It is not complicated in construction, and the method of walking is simple. The shoe of the advanced foot strikes the ground with its hinder part, and then, the other foot being raised, the body rolls forward on the curve until the front end of the shoe comes in contact with the ground. This motion is continually repeated, and the length of the shoe is such that twice

the natural pace is made at each step. The pressure of the shoe on the ground compresses a spring, which, when the



Made in Germany

shoe is raised, impels it forward without requiring any exertion on the part of the wearer.

It is claimed for the shoes that their great elasticity as well as their length is responsible for the speed with which a person wearing them can get over the ground, and that it is easier to maintain a perfect balance than it is to remain upright on a bicycle.

#### • • • HOLLOW CONCRETE TELEGRAPH POLE

The latest type of telegraph pole has a body of concrete and is hollow. This makes it light but does not impair its strength. The reinforcement of the pole is a steel skeleton over which the concrete is poured. The illustration shows the comparison between the concrete pole and an ordinary wooden pole and is evidence of the improved appearance. The inventor claims that this pole can be made for less than the cost of wooden poles and has the further advantage of not being susceptible to decay.

#### • • • RAILWAY BRIDGE AT VALLEY CITY, N. D.

The huge railway bridge shown in this illustration has been erected by the Northern Pacific Railroad at Val-

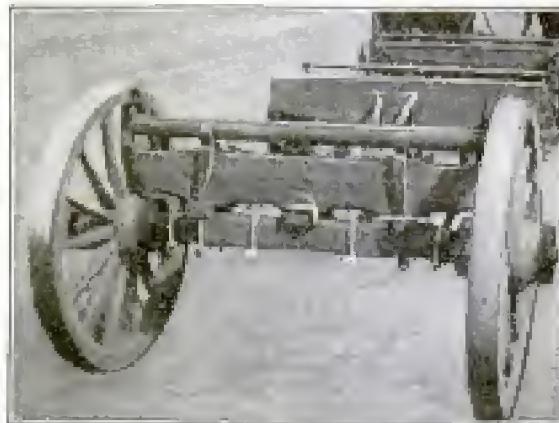


This Structure is 150 Ft. High and 3,700 Ft. Long

ley City, N. D., to eliminate the heavy grade at that place. The structure is 3,700 ft. long, and rises to a height of 150 ft. above the river. The girders, three of which are 101 ft. in length, and the others 45 and 75 ft., are supported by 30 towers. The three long girders weigh 40 tons each. The entire weight of the structure is 7,000 tons. Nearly 225,000 rivets were used in its construction.

#### • • • SELF-UNLOADING LUMBER WAGON

This self-unloading lumber wagon has a 3-in. steel roller mounted on the rear bolster, and 1½-in. rollers on the front and center bolsters. The center bolster rests on the reach. In the ends



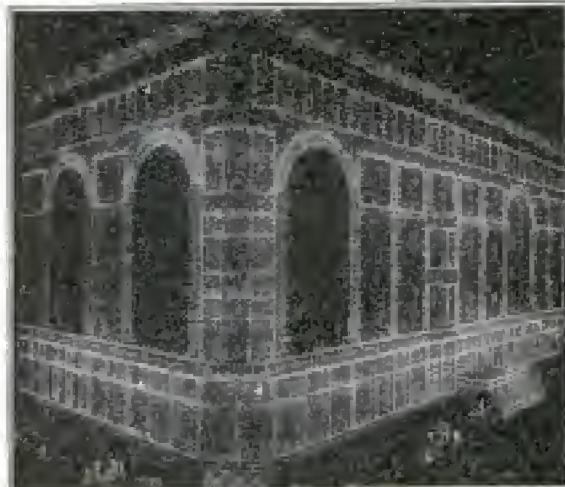
A Useful Hint

of the roller on the rear bolster are holes into which a lever is inserted. A few turns of this lever starts the load rolling and as the team of horses pulls the wagon slowly forward the lumber slides to the ground. In this manner

a load of 3,000 ft. can be unloaded in less than a minute.

ILLUMINATION AS AN ADVERTISEMENT

One of the most remarkably illuminated buildings in the United States is that occupied by a department store



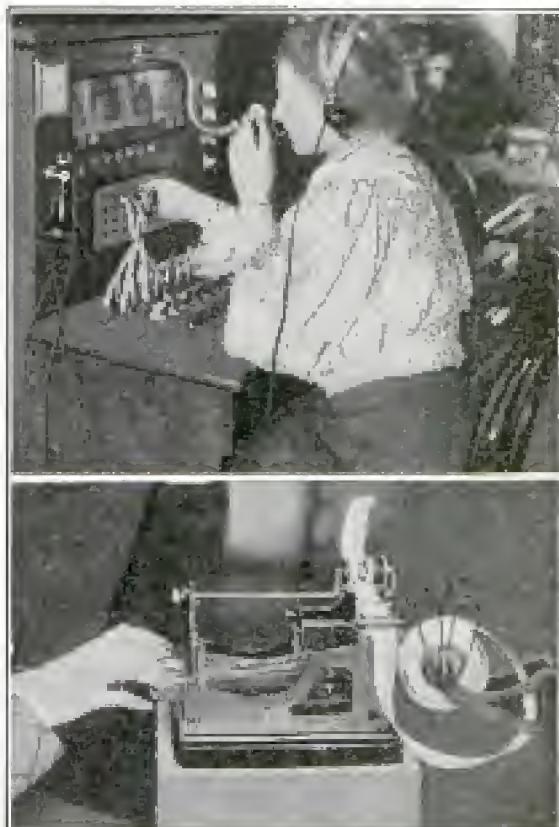
6,000 Lights Burning

in Cincinnati. Over 6,000 electric bulbs are used to outline its exterior, and when all the lights are burning the illumination is so great that the glare lights up the sky with a reflection that can be seen a great distance.

DYNAMITING STUMPS

Dynamite is one of the chief factors used in converting the stump lands of western Oregon into thriving farms. The first illustration shows a workman placing a charge in an Oregon fir stump, and the second gives a clear

idea of the result. This stump measured  $3\frac{1}{2}$  ft. in diameter at the top, and the charge consisted of 18 lb. of explosive, 20 per cent dynamite.—Contributed by C. G. Schneider.



TWO VOCATIONS FOR THE BLIND

In these illustrations are shown two vocations at which blind women are working. The first is a private telephone switchboard, and by the sense of touch, always highly developed in the blind, the girl makes connections as rapidly and accurately as her more favored sisters. The second is a blind



A Giant Stump Before and After Wrecking



woman taking dictation on a shorthand typewriter. This machine writes shorthand on a tape which is transcribed by an assistant who can see.

### ANIMAL-LIKE APPEARANCE OF KELP

Tourists, visiting the beaches of Southern California are filled with wonder at the many strange forms of



Kelp Gourds from Pacific Coast

plant life washed ashore after a storm. One of the most weird and unusual forms is the gourd kelp, the bulb portion of which is sometimes as large as a child's head and topped with great spreading forked branches, not unlike the antlers of a deer. At the base of the trunk is attached a tail or stalk measuring from 10 to 50 ft. in length.

### NORTHERN PACIFIC TRAIN DYNAMITED

The Burlington Flyer, eastbound on the Northern Pacific Railway, was blown up with dynamite near Butte, Mont., Wednesday night, May 1. The engine and mail and refrigerator cars were smashed, and the entire train derailed. The engineer, fireman and a tramp riding on the front end of the mail car were killed.

One illustration shows the mail and refrigerator cars in a tangled heap, and the other shows where the tramp and engineer met death. The tramp was



Photo by W. A. Billings

Mail and Refrigerator Cars

cut out of the end of the mail car with axes at the place indicated by the triangle. The place in the embankment where the engineer was pinned by the tender is designated by the cross. He died a few hours after being dug out.

Since its establishment the Department of Agriculture has cost the United States more than \$200,000,000. It has given employment at different times to 58,000 experts and professors, and issued 17,675 publications.



Cross—Where Engineer Was Dug Out with Shovels  
Triangle—Where Tramp Was Cut from Mail Car

# NIAGARA FALLS TO ELECTRIFY ONTARIO

**Government Will String a Network of Wires Through the Central Part of Ontario to Furnish Power from Niagara Falls to Cities, Towns and Villages—Greatest Government Ownership of Public Utility in Western Hemisphere**

The largest and most complete system for electric transmission ever attempted, and the only public system in the world which is provincial in size, will soon inaugurate a new era in the history of the Province of Ontario.

After eight years of struggle, difficulty and agitation the Hydro-electric Commission of that province has at last succeeded in putting through its gigantic project of furnishing government power to all the cities, towns and villages in central Ontario from the inexhaustible power of Niagara Falls. The first contract with the Commission was signed by Toronto, and calls for 10,000 hp., the first supply to be delivered to that city in December, 1909. Among other cities that signed contracts are London, Hamilton, St. Thomas, Woodstock, Guelph, Berlin, Stratford, Preston, Galt and Ingersoll. Toronto will pay \$18.10 per horsepower per year and St. Thomas \$26.50 per year. The prices the other cities will pay range between these figures, according to distance from source of supply and amount of power contracted for. As soon as the lines feeding these cities are completed a line will be run to Windsor, 247 miles from the Falls.

The undertaking, which is now nearing culmination, is a gigantic one, furnishing, as it will, the power to light cities, run electric railways and drive the heavy machinery of hundreds of manufacturing concerns. The nucleus of the system is, of course, at Niagara

Falls, where the Hydro-electric Commission will purchase power from the Ontario Power Company. Taking it directly from the generators of that company at 12,000 volts, the current will pass to the step-up transformer owned by the Hydro-electric Commission, and from that point until it is delivered to the cities, towns and villages of Ontario it will be absolutely owned



and controlled by the Commission. The transformer will step the current up to 110,000 volts, the highest voltage in the world at which power is transmitted.

The main transmission line will run from Niagara Falls to Hamilton. This line will consist of two heavy circuits on one line of towers, each circuit consisting of three cables. The cables will be strung in a triangular form, 9 ft. apart. The insulators will be the largest and most powerful in the world. From Niagara Falls to Hamilton each circuit will have a carrying capacity of 40,000 hp. Consequently the line will have a total carrying capacity of 80,000 hp., with a possibility of an overload to 120,000 hp. The towers will be

60 ft. high and about 500 ft. apart, set in a concrete base.

The main interswitching station for the province will be in the Dundas valley, near Hamilton. From this point the transmission lines will form an immense loop, taking in the cities above mentioned and all intermediate towns and villages. Such a system gives security in case of storm, it not being likely that the whole area covered would be under the same stress at the same time. In case of a breakdown on one side of the loop, the current could be switched around the other way, thus leaving only a short portion of the line out of commission. The area to be covered is divided into eight districts, and in each one of these a transformer will step the current down from 110,000 volts to 12,000 volts to be transmitted along low tension wires to the places in the district.

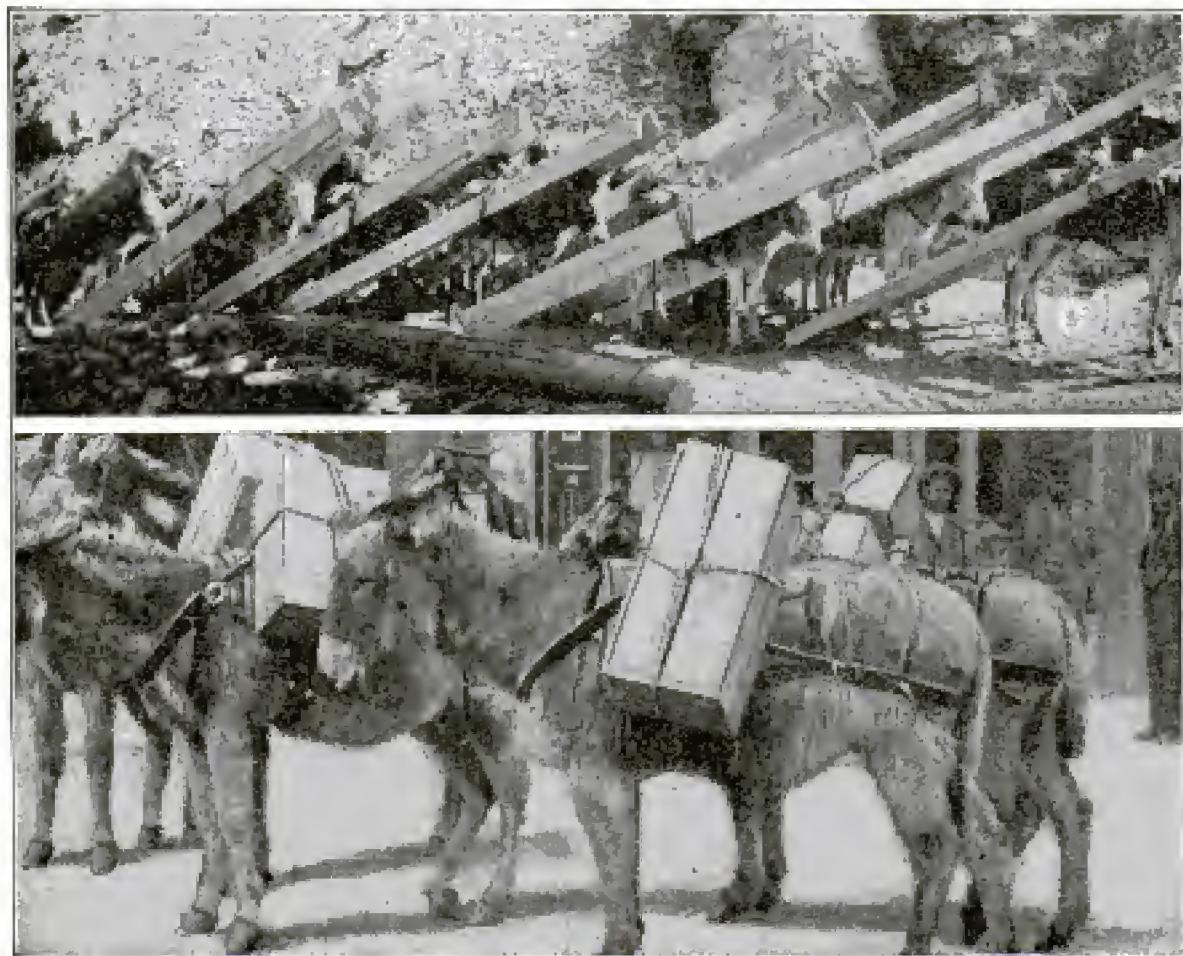
The province of Ontario has throughout its history suffered from the serious handicap of having no discovered

coal within its borders. In less than 18 months the great central part of the province will bid farewell forever to dependence upon coal as a source of power. The project will cost the province \$3,500,000. Ontario has an area of 220,000 square miles.

A party of musicians sailed from New York recently as part of the government's plan to furnish wholesome amusement for the thousands of men at work on the Panama canal.

#### BURROS CARRY EXPLOSIVES

Up in the high, rocky places where railroad trains cannot penetrate, the burro is still supreme as burden carrier. In this illustration is shown two trains of these sturdy little animals ready for the start up the mountain side. The burros in the first train are loaded with heavy mine supports, and in the second with cases of explosives for blasting.



Packing Mine Material on Burros

## HARVESTER OPERATED BY MOTOR AND PULLED BY HORSES

Harvesting machines pulled and operated by horses or by traction engines are a familiar sight in the grain-growing sections of the country, but a new departure is a harvester, the machinery of which is operated by a gasoline motor, although the complete outfit is pulled by horses.

With such an equipment it is claimed that the farmer can harvest his crops with one-half the horses otherwise necessary, as by the usual method the horses not only pull the machine over the ground, but have to pull hard enough to produce the power to operate the cutting, elevating and binding machinery. The illustration shows a 6-horse machine pulled by only two horses.

The motor is so constructed that it can be quickly attached or detached to any make of harvester. In attaching it no alterations are necessary, and but a few minutes' time is taken in connecting the sprocket wheel of the motor

horses as before. In operation the motor is rigidly and securely attached to the main frame of the machine, and when detached can be used for any other work on the farm requiring power.

According to telephone experts the best telephone does not transmit to the



ear more than one-thousandth part of the energy which it receives from the line.

## WATER BICYCLE RUNS ON LAND

A California youth has constructed a water bicycle which will also run on land. When he wishes to enjoy the pleasure of a trip on the water he mounts the machine in front of his home, rides through the streets to the beach, and glides out onto the ocean's surface. He made the machine by fastening a light steel framework to the bicycle frame and placing two tubes of galvanized iron, 9 in. in diameter by 9 ft. long, 4 ft. apart. Between the spokes of the front wheel he placed a number of thin boards,

forming a rudder. On every other rear spoke he fastened small blades or paddles of tin, not much larger than a business card. A canvas guard on the rear wheel prevents the water from splashing.

to the driving sprocket of the harvester. The starting of the harvester by the horses starts the motor. If any accident should happen, or the fuel run out, the driving chain can be quickly removed and the machine operated by



## LITERALLY "SINKING" A MINE SHAFT

By Wm. C. Richardson

[See Illustrations on opposite page]

With the rapid depletion of the anthracite coal deposits of eastern Pennsylvania, leaving to be mined but narrow strata of the valuable mineral in places so near to rivers as to make operations all but impossible, owing to the danger of floods, the ingenuity of mining engineers has been taxed to the utmost.

As the result of these conditions, one of the most remarkable experiments ever attempted with concrete has been started, and has already progressed so far as to make success seem a certainty. It is nothing less than literally "sinking" a concrete shaft near the Susquehanna river a few miles from Wilkes Barre, Pa., for the Delaware and Lackawanna Railway Company. So low is the land at this point that each spring the river overflows it, filling the shaft and causing previous attempts at mining operations to prove a failure.

A shaft wall or caisson of reinforced concrete is being built above ground and allowed to sink by its own weight through the soft soil, in which are layers of gravel, quicksand and clay, until solid rock is struck some 80 ft. below. When the rock is reached it will be quarried out in the usual way and, should not the cutting shoe find a level resting place, it will be blocked up and all the interstices poured full of cement to form a water-tight joint. The total depth of the shaft, as now contemplated, will be 800 ft.

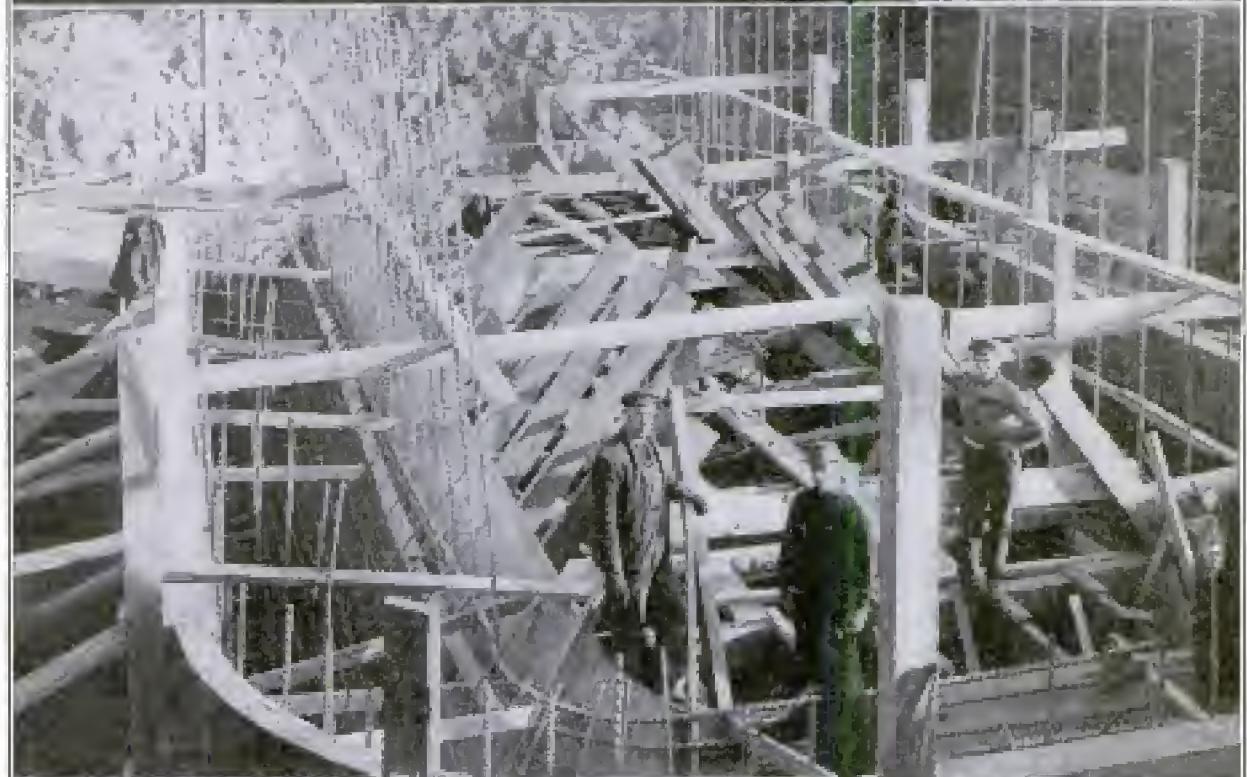
In sinking the shaft, the first operation was to construct a steel cutting shoe, oblong in shape, 59 ft. 6 in., by 28 ft. Its outer extremity was of  $\frac{1}{2}$ -in. steel, about 30 in. high. To the inside of this, about 8 in. from the bottom, was riveted a  $\frac{1}{2}$ -in. steel horizontal plate, 2 ft. wide, to act as a shelf for the concrete, which tapers from a width of 24 in. at the bottom to 7 in. at the top.

First a pit, 15 ft. in depth, was dug, into which the cutting shoe was placed, the bottom of the pit being made perfectly level to receive it. The moulds or forms for the concrete were erected on the shelf within the shoe and the walls built in the customary manner to a height of 20 ft. When these became sufficiently hardened the earth was dug away from within the shoe, and as the excavation progressed the weight of the walls forced the steel cutting edge gradually downward. By placing the molds on top of the hardened walls and repeating the operation, the cutting shoe has been driven down until it is expected that the entire shaft will be completed in time for coal to be mined next winter.

Great care has been needed in the operation to keep the concrete walls vertical. That is, to prevent one side from sinking more rapidly than the other. This required constant watchfulness and, when it did occur once or twice, the excavation from the inside was increased or decreased accordingly.

In all, some 3,000 cu. yd. of concrete and 145 tons of reinforcing steel will be used in the walls, which will be carried up 15 or 20 ft. above ground, so that, even when the surrounding fields are under water there will be no danger of the river entering the shaft.

When completed, the shaft will be divided into three sections, the first to accommodate two cages for hoisting coal, the second for a pump and ladder-way, and the third for an upcast airway. It is estimated that the cost of the shaft will be \$200,000, of which the concrete work will cost about \$75,000. Two powerful ventilating fans, each with a capacity of 350,000 cu. ft. of air per minute, will be installed, one for regular use and the other for emergency cases. Costly as the construction will be, it is believed that the mine which is to be

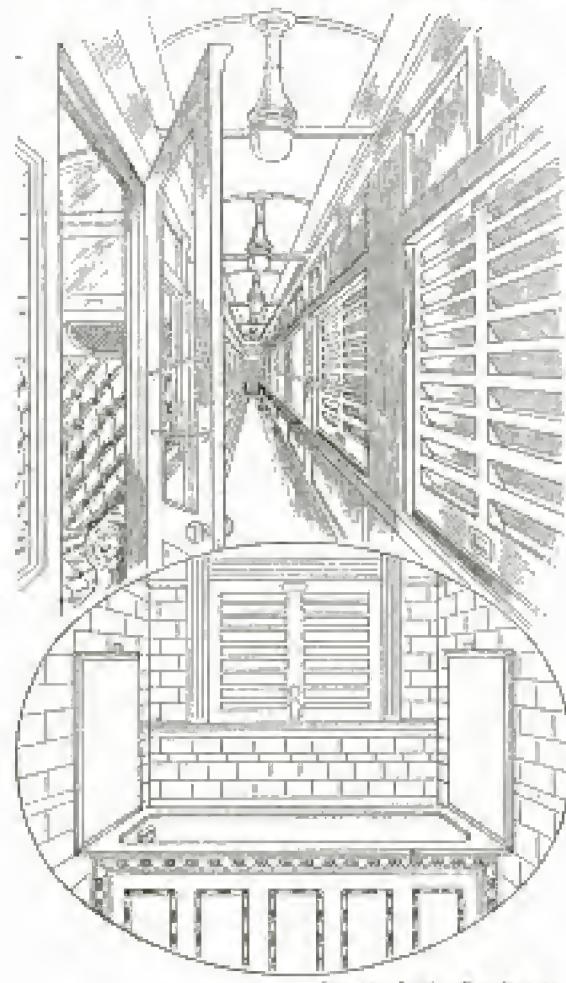


developed in this new manner will be rich enough to repay the entire expense within two or three years.

Concrete is rapidly forging to the front in all lines of industrial building, and should the construction of a mine shaft in this manner prove successful, and in all probability it will, there opens a new and clearly defined field. Large wells could be sunk in the same way, and where quicksands have hitherto proved invincible, such construction would, it is believed, be possible.

### THE FINEST RAILWAY TRAIN IN INDIA

The American has long been taught, and perhaps rightly so, that the United States is the real home of the railroad,



Courtesy Indian Ry. Gazette.

#### The Bathrooms Are Fine

but a passenger train has just been placed in service in India by the side of which the finest passenger train in this country would not have the advantage, as far as comforts for travelers are concerned.

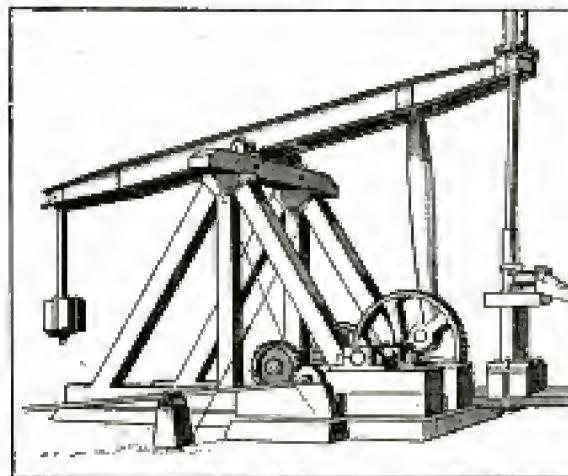
Chief among the special features of this train, which runs between Calcutta and Bombay, are the bathrooms.

There are three of these in each first-class coach, or corridor saloon, as they are called. The tops of the basins are almost on a level with the floor and are provided with hinged covers to keep out dust and dirt. The floors are tiled with unglazed encaustic tiles and the sides are paneled to the window sills in a glazed sanitary tile of dark shade.

The train consists of two composite baggage and third-class coaches, three first-class corridor saloons and a dining car. The first-class coaches are 63 ft. long, 10 ft. wide, and 9 ft. high. Each car is divided off into four compartments with four berths to each, and an additional stateroom at one end. The seats and berths are upholstered in dark green morocco. At intervals throughout the entire train are electric fans which keep the air in circulation. In the illustrations are shown the neat wood bonnets which protect travelers from the scorching sun.

### BALANCED BEAM PUMPING JACK

The 6-in. pump of this large balanced beam pumping jack is fastened

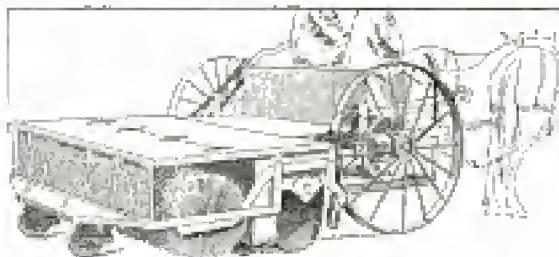


Odd Type of Pump

to the right end of the beam. At the rear end is a box loaded with sufficient weight of stone to just balance the weight of the piston and water.

STREET CLEANING WITHOUT DUST

One of the great disadvantages of the ordinary street-cleaning machine is the cloud of dust which rises as it passes over the pavement. This machine settles the dust with a light sprinkling of water, sweeps it into a funnel and deposits it in piles at the



A "New Broom" Etc.

curb. The tank and sprinkler are situated under the driver's seat. In the funnel, which is shown just forward of the sweeper, is a spiral conveyer which conveys the dust and dirt to the side. The machine is used in Waterloo, Iowa.

The grand total of excavation on the Panama canal during the month of April was 3,296,096 cu. yd. This was 184,174 cu. yd. less than for the month of March.

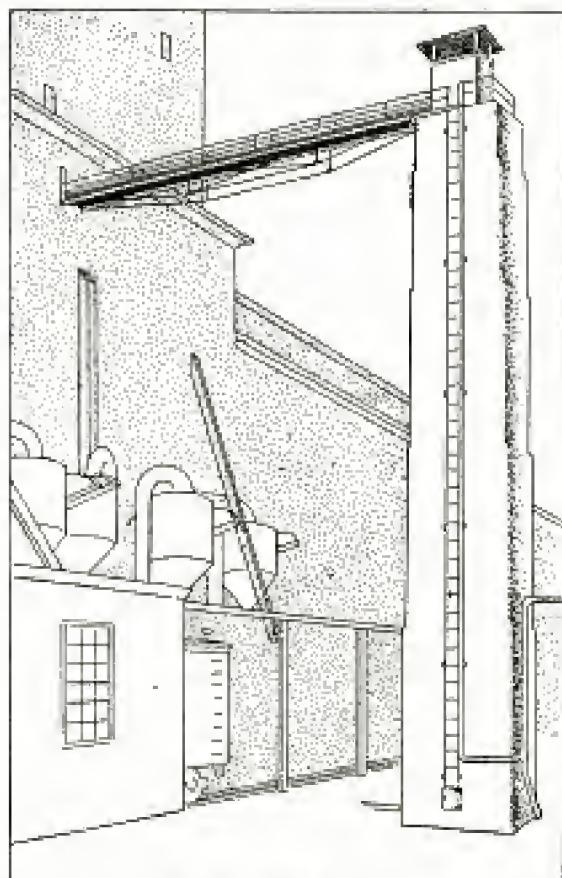
RUSSIAN TORPEDO BOATS HOISTED OVER WALL

A fleet of motor torpedo boats said to be the fastest in the world, has just been completed for the Russian navy. In order to launch the boats they were hoisted over a steep harbor wall and lowered into the water. The boats were constructed to run at a speed of 46 miles an

hour, but just what their speed is has not been given out.

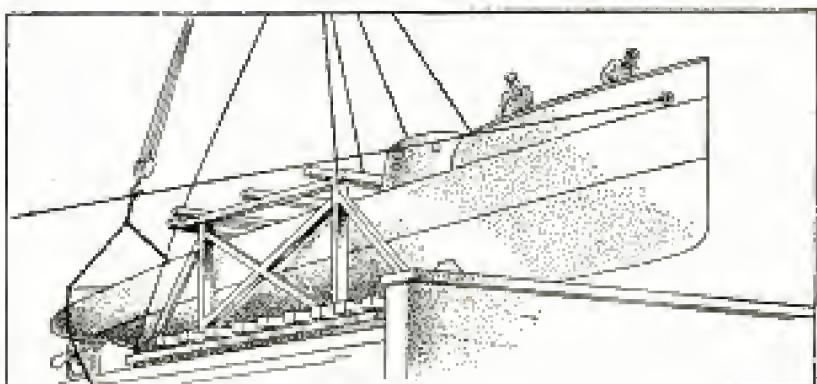
A CONCRETE BLEACHING TOWER

The latest type of grain bleaching tower is constructed of concrete, the



The Bleaching Tower

shelves being of wood, so that they can be removed or renewed. Across the bridge connecting with the working elevator is a trough containing a 12-in. screw conveyer by which the grain is carried into the bleaching tower. As it falls over the shelves steam perme-



ates through the mass long before the sulphur fumes are reached. Another conveyor at the bottom removes the purified grain.

The experience of elevator men who have bleaching towers running up through their elevators shows there is but little danger of fire from such a source, but the majority of insurance companies request that they be placed outside. The bleaching tower is used for cleaning the discolored coats of grain, and destroying germs. Oats are the most often discolored on arrival at the elevators, but by this treatment the grains are turned out a rich yellow color. Wheat and barley are also run through bleaching towers when their condition needs it.

• • •

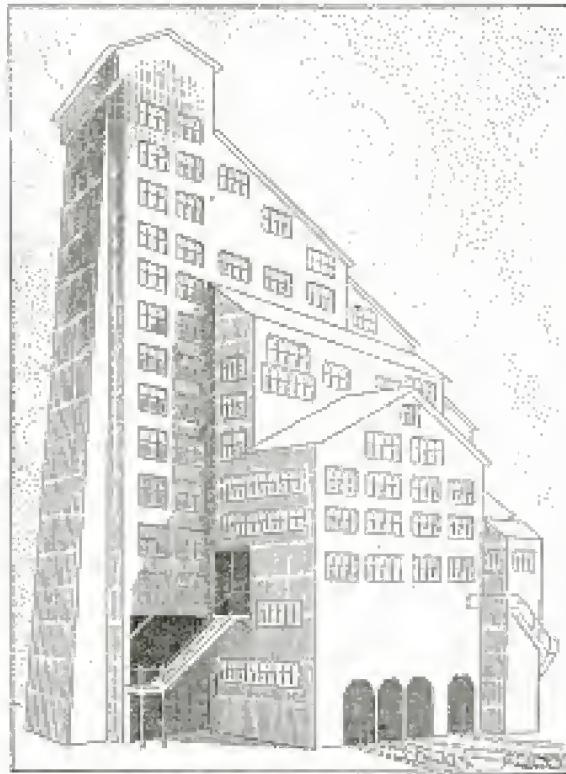
#### HOUSING EMIGRANTS IN HAMBURG

The city of Hamburg, Germany, has erected the buildings shown in this illustration for housing emigrants who are forced to wait at that port for their sailing. By such means the city avoids danger from epidemics, and insures the emigrants better protection and care than they were able to obtain before.

Nearly 200,000 emigrants took passage from Hamburg to the United States in 1907, and the list is expected to grow year by year. Buildings are provided in a distinct section for medical examination, fumigation, bathing, etc. The living section includes an Evangelical and a Catholic church, a synagogue, dining halls, sleeping and waiting rooms and a music pavilion.

#### LARGEST COAL BREAKER IN THE WORLD

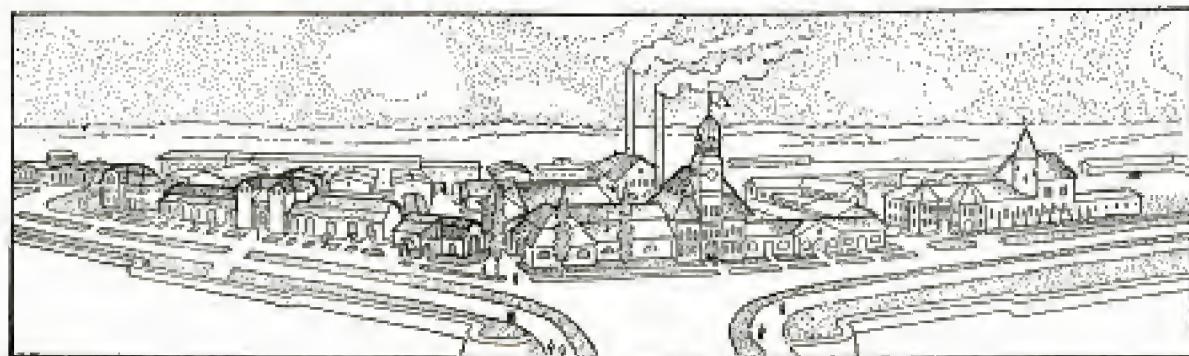
The huge coal breaker at Plymouth, Pa., known as "Nottingham No. 15," is the largest in the world. Its capacity is 1,000 cars of a size large enough to carry an equivalent of 7 tons of finished coal each. Not more than 200 ft. from the breaker is a shaft 350 ft.



7,000 Tons of Coal Daily

deep from which one of these cars arrives with coal from the mines every 20 seconds.

Here, as everywhere else, mechanical devices are superseding manual labor. In the old-style breaker at least 150 men and boy pickers were employed, but in this breaker a spiral coal-picking



Palatial Quarters for German Emigrants

machine has made it possible to dispense with at least half of that number. The breaker cost \$200,000.

### REINFORCED CONCRETE PROMENADE

A reinforced concrete promenade, 20

Venice, Cal. In making such a walk 2 in. of rough concrete is first tamped and wire netting spread over it. Cross wires are laid across the netting at intervals of 6 in., and then 2 in. more of concrete spread over the whole. The top finish is dressed with a light covering of lampblack, mixed with a little



Building the Mile-Long Sidewalk

ft. wide and 1 mile long, has been constructed along the sandy beach at

Portland cement to give it weight, and lined off in 36-in. squares.

### CUTTING CAST-IRON GAS PIPE

This cutting machine will cut through an 8-in. cast-iron gas pipe in about 15 minutes. It has two cutting wheels of the usual size and shape in the sliding frame, and every other link in the chain circling the pipe has smaller cutting wheels. On account of the many wheels only a rocking motion is required to do the cutting, and as the pipes are heavy a vise is unnecessary.



The German North Sea fishing boats are to be equipped with wireless telegraph instruments.

### A PLANT FOR BURNING SHAVINGS

This plant, for the disposal of shavings and sawdust by burning, differs from the ordinary plant of its kind in that the furnace is constructed of brick



Built to Burn Shavings

instead of iron. The shavings and saw-dust are blown from the mill to the burners through the pipe.

♦ ♦ ♦

### HUGE LOCOMOTIVE ON MAMMOTH STONE BRIDGE

♦ ♦ ♦

In this illustration is shown one of the most powerful locomotives in the world, on the mammoth stone bridge at Lanesboro, Pa. The locomotive is one of the three recently placed in commission as pushers by the Erie Railway. The great weight of these engines, evenly distributed on the drivers, does away with the slipping common with other engines used for the same purpose.

The stone bridge is one of the famous landmarks of America's early railroad history. It was erected in 1849 at a cost of \$325,000, and is of solid masonry, a quarter of a mile long and 100 ft. high at its center. It consists of 17 arches.



Stone Bridge Built in 1849

♦ ♦ ♦

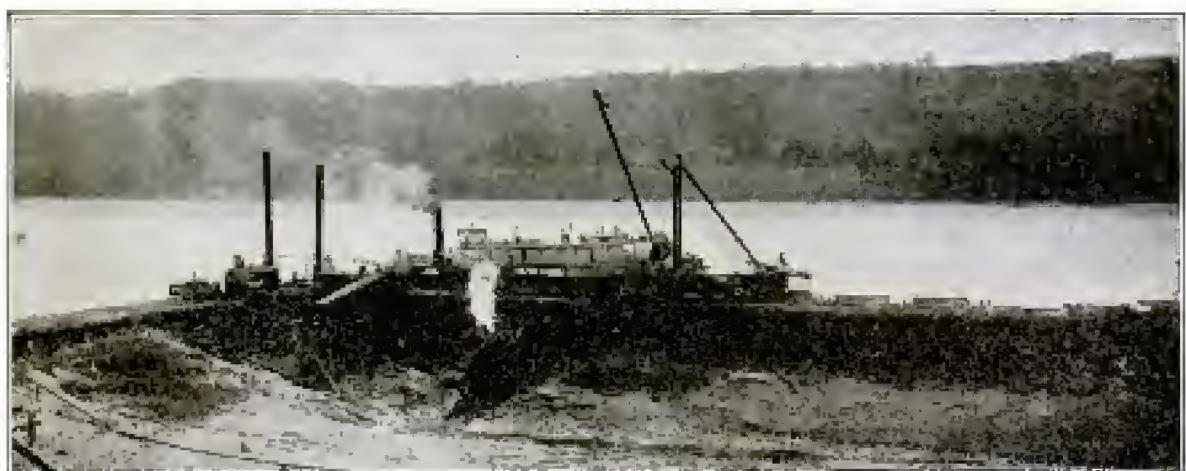
### DREDGING THE OHIO RIVER

♦ ♦ ♦

The United States government is scooping out the Ohio river bed at a location 12 miles below Cincinnati, Ohio, to give that city a permanent

harbor 9 ft. deep. The harbor will extend from the lock and dam, to be known as dam No. 37, to a distance of 25 miles upstream. Eventually the work of dredging out the river will be extended on up to Pittsburg, Pa., and to Cairo, Ill., making the Ohio river navigable the entire year. The river is at present navigable for only part of the year.

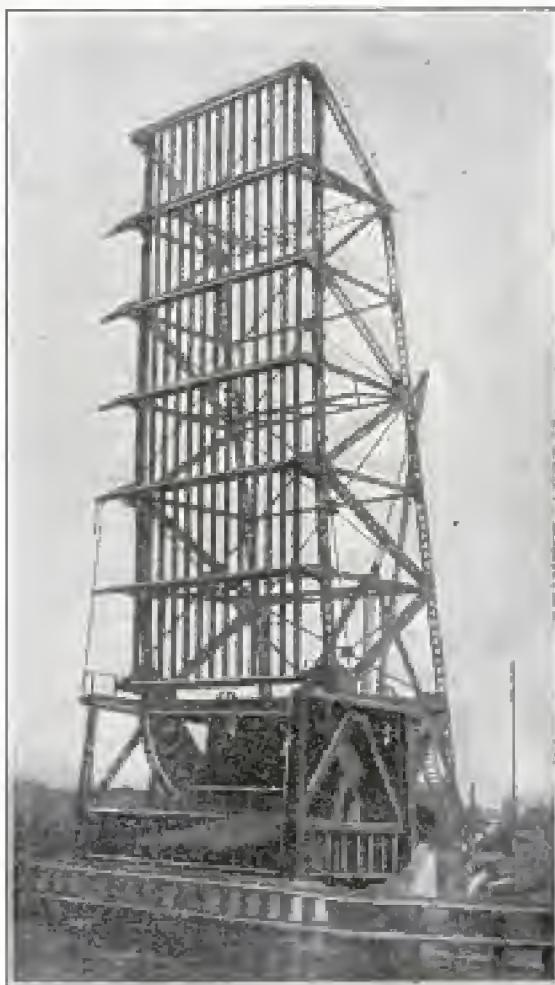
An amazing surgical operation is reported from Berlin in which a doctor took the perfectly healthy knee-joint from a leg amputated from one patient and successfully substituted it for the undeveloped knee-joint of another patient.



Preliminary Work on Cincinnati's New Harbor

### UPRIGHT DRAWBRIDGE

This upright drawbridge was built standing on end, as shown in the illustration. Its base and rocker gear were



Stands 170 Ft. High

constructed first and then the steel framework joined together end on end. When completed, the scaffolding was cleared away and the bridge lowered into position. It spans Swan Creek, Toledo, Ohio.

### CONCRETE ARMOR FOR WARSHIPS

An Italian engineer has submitted proposals to the Italian government for the use of concrete armor on Italy's new warships. A series of trials will be made by that government to test the resisting power of such material. The Italian government already owns several concrete ships. One of them, a 1,000-ton boat, was tested by making

it collide with a much larger steel ship armed with a battering ram. The concrete ship came off victorious.

A concrete armor plate, reinforced with steel bars, would be much thicker than armor plate of steel, but as it would weigh one-third less, a ship could carry much more of it. A vessel can pull up almost anywhere where there is sand, and a concrete ship with a small amount of cement in storage could easily be plugged up, no matter how large the hole. It has been found that concrete buildings are almost indestructible, and that when occasion arises to pull them down, they have to be blasted out in sections with heavy charges of dynamite.

### A SCHOOL OF AERONAUTS

This illustration shows the interior of one of the instruction rooms of the aeronautics school in New York, claimed to be the first in the world. The construction of spherical balloons,



A Lecture Room

dirigible balloons, and heavier-than-air flying-machines is taught in conjunction with aero-dynamics, which, in simpler words, is the science of flying.

## ICE FROM PRESSED SNOW

**Snow or Broken Pieces of Ice Placed In Molds Comes Out Transparent Ice Pitchers, Drinking Tumblers, Butter Dishes and Hollow Tubes**

(Copyrighted by Dana Dudley, 1908.)

Artificial ice from water by the ammonia process has long been an established industry, but I have perfected a method by which I can make ice of any thickness or shape desired for use, ornament or amusement, from snow or broken pieces of ice, by the simple application of pressure.

I discovered that a certain pressure upon snow wet with water and placed in molds would, when this pressure was reached, produce perfectly clear ice in any shape or form desired. To ascertain when this pressure is reached I drill pin holes around the bottom of the mold. As the piston is forced in, water is forced out through these holes. When the necessary pressure is reached this water changes to ice threads, and on opening the mold I find a cake of pure, solid ice where the snow had been but a minute before. For my own amusement I have often placed a key or coin in the snow and turned them out in the center of the ice.

The possibilities of such a process are many. Ice only a quarter of an inch thick can be jammed into molds and made into 4-ft. blocks, 15 in. thick. Irregular cakes of ice or broken pieces could be pressed into solid cakes at the ice houses. In such countries as Spain or Italy, where servants are sent with padded suit cases to bring snow from the mountains for their masters' use, the snow could be pressed into cakes of ice and slid down runways to the hotels below.

For amusement I have turned out many shapes and sizes of ice. I have made molds that turn out tumblers from which water can be drunk, pitchers, butter dishes and hollow tubes of ice pipe. Small ices can be made with figures or portraits imbedded in them for individual butters at the table.

For large cakes of ice hydraulic presses are necessary. By using such presses four cakes can be pressed into one. All that is necessary is to wet them and apply the pressure.

A very interesting test can be made with a machinist's vise as follows: Take a piece of 1-in. iron pipe, 4 in. long, and fit a pipe cap on the end. Drill four pin holes through the side of the cap or through the pipe close to it. Make a piston of iron as large as the size of the pipe allows. Fill the pipe with wet snow, jam it in solid, and place the piston in position. The cap of the pipe must be placed against one jaw of the vise and the end of the piston against the other. Screw the jaws together until the threads of ice begin to run through the pin holes. On removing the piston you have solid ice. Hold your hand around the pipe to warm it a little and the cone of ice will slip out.

[Editor's Note:—The claims of Mr. Dudley are quite possible. So are a great many others that work out perfectly in a laboratory, but prove impracticable on a larger scale because of cost. Wonderful discoveries have been made, which, if they had only proved economical, would have revolutionized existing conditions. The natural tendency of two pieces of ice to freeze together is easily demonstrated by placing a couple of cakes in a tub of water on a warm day. An ammonia ice plant, which is practical and not prohibitive as to cost, would, and to a great extent has, remedied such conditions as are mentioned in this article as pertaining to Spain and Italy.]

## OLD COVERED BRIDGE IN OHIO

This old covered bridge at Monroeville, Ohio, was constructed in 1836 and is now in almost as good condition as when erected. It has two separate roadways for teams going in opposite directions.



"As Dry as a Covered Bridge"



In the Cyclone's Path

## DEVASTATION IN WAKE OF CYCLONE

The widespread devastation which followed in the wake of the cyclone which a few months ago swept through Texas, Louisiana, Mississippi and Alabama, is graphically portrayed in this illustration. The photograph was taken near Natchez, Miss.

## WORLD'S LARGEST AIRSHIP

The dirigible balloon just completed by Count Zeppelin for the German army is the largest airship in the world. It is 444 ft. long, its diameter is 50 ft., and it will be driven by three 140-hp. engines. Count Zeppelin hopes the new balloon will attain a speed of 47 miles an hour, and calculates that it

will be able to travel a distance of 1,400 miles without landing. It is provided with searchlights for night traveling, and a complete apparatus for sending and receiving wireless messages.

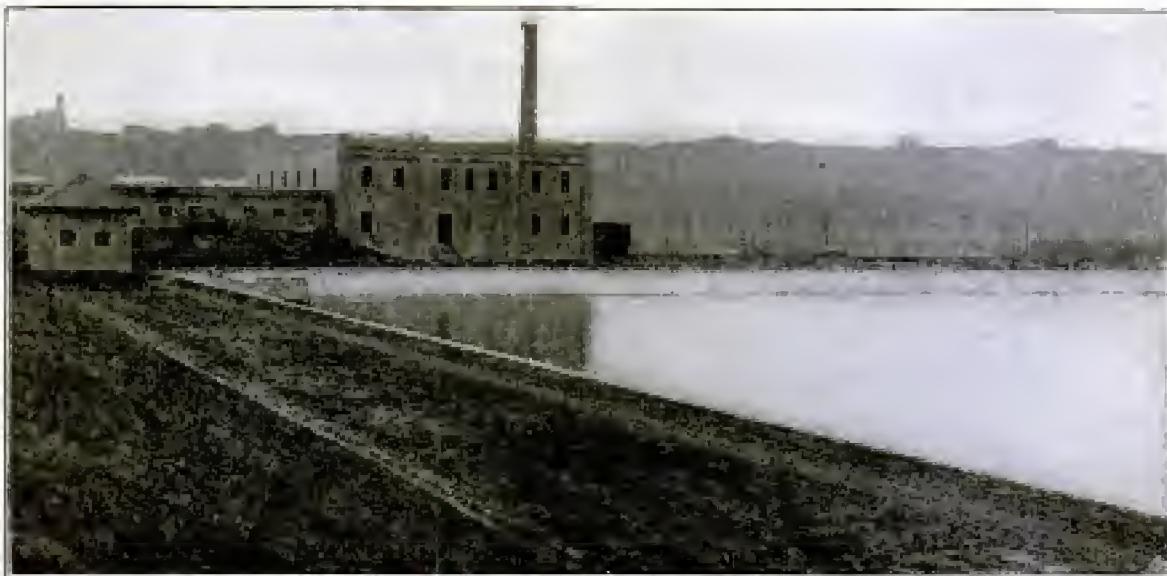
Because of the lichens which grow abundantly on the stone-paved streets in Madeira, making them slippery, it is possible to use sleighs the year round.

## WOODEN CAISSENS FILLED WITH CONCRETE

The \$100,000 pier shown in this illustration was constructed with wooden caissons, which were then filled with concrete. The caissons are 6 ft. in diameter. The pier is at Long Beach, Cal.



New Method of Constructing Pier Supports



Panoramic View of the Big

### GERMAN NAVAL CADETS IN TRAINING

The cadets of the German navy are trained in two types of vessel, one of which is the antique sailing ship with masts and yards, the other a more modern type of iron cruiser. The first type



Cadets in the Main Top

of vessel, although now obsolete, is useful in teaching the four necessary qualities of a seaman's character, courage, prudence, resolution and presence of mind.

### CINCINNATI'S TWELVE MILLION-DOLLAR WATERWORKS

A fight for pure water has been in progress throughout the state of Ohio for the past 10 years. Probably in no other state is so much surface water used for drinking purposes, and probably in no other state of the Union have there been so many deaths from typhoid fever and other causes directly traceable to the drinking of polluted water.

So astounding has this mortality been in Cincinnati that it was decided to abandon the old water system and build a new one miles above the city on the Ohio river. The new system has just been completed at an expenditure of nearly \$12,000,000 and the new filtration system has reduced the death rate from typhoid fever to a minimum.

Nowhere in the United States is there another such modern water supply system as in Cincinnati. It is said to be the most expensive plant ever built. It has a pumping capacity of 120,000,000 gal. per day and the pumps are the largest ever built. The raw water is all filtered by means of chemicals and gravel beds before it is directed into an immense gravity tunnel through which it flows beneath the Ohio river bed to the city 12 miles away. It took four years to build this gravity tunnel and about 11 years



Reservoir Cincinnati's New Waterworks

to get the whole system in working order. The plant is yet far from being completed in detail and it is said the waterworks when it finally will be finished will be the model water system of the world. No expense has been spared in its construction and the engineering fraternity at large has been traveling to Cincinnati from far and near to get a glimpse at this modern work.

A town has already sprung up around the new waterworks and has been named California after the state on the Pacific coast. The city, whose chief product will be pure sparkling water manufactured from the murky water of the Ohio, already boasts of several thousand inhabitants.



A Filter Room

### CORING GRANITE COLUMNS

Four granite monolithic columns, each 18 ft. long, and 2 ft. in diameter, the largest in the world to be so treated, were successfully cored and placed in



Monolith Ready to Hoist

position at the entrance of one of San Francisco's new skyscraper buildings.

The work of coring the columns was done with drills  $1\frac{1}{2}$  in. in diameter, started at each end and boring in 9 ft. Eighteen holes were bored completely through each column, forming a circle. The granite between the holes was carefully clipped away by flat-edged drills.

Before being cored each column weighed 16 tons, and when completed but 8 tons. When the boring was finished the columns were carefully hoisted vertically, leaving the huge core standing in a perpendicular position.

The hoisting of the columns and the sliding of them down over the steel I-beams which form their center was accomplished without the slightest chipping of the granite. The space left between the beams and the ragged insides of the columns was filled with concrete.

Instead of quarrying the columns horizontally, as is the usual procedure, they were quarried vertically. Engineers claim that columns have a greater weight-resisting power when quarried in this manner, as they then rest in their natural position.

#### RAILROAD BALLASTED WITH GOLD

A report comes from the Canadian Northwest that a section of the Canadian Northern Railway, running northwest from Sudbury and crossing the Vermillion river, is ballasted with "pay gravel." Every yard of the gravel used is claimed to contain gold dust in quantities worth from 50 cents to \$1.

#### THE START OF A BALLOON ASCENSION

In making the start in a balloon ascension for a double parachute jump the aeronauts stand clear of the balloon, grasping tightly the trapeze bars at the end of a long lead of ropes. As the balloon starts to rise they run forward until lifted from the ground. In the illustration are shown W. J. Penhold, the Australian aeronaut, and his companion making a double ascension at San Francisco.

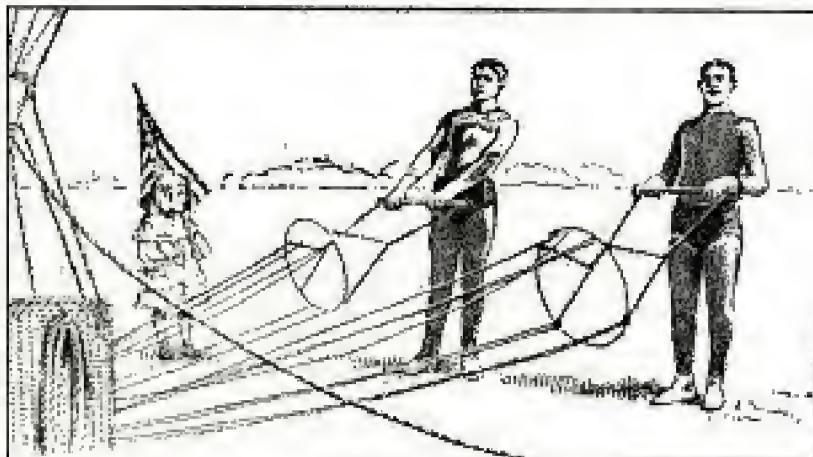
#### CAISSON CONSTRUCTION UNDER DIFFICULTIES

In building a caisson 60 ft. deep in sand at Long Beach, Cal., it was found necessary, on account of the great pressure of water and the inrush of sand, to let the water into the caisson and to



Caisson Work Is Dangerous

feed the concrete to the bottom through the long funnel shown at the right of the illustration. The diver, when at work below, had his hand caught under the funnel the day before the photograph was taken. The funnel had to



be pulled to the surface before the pressure could be broken and the hand released.

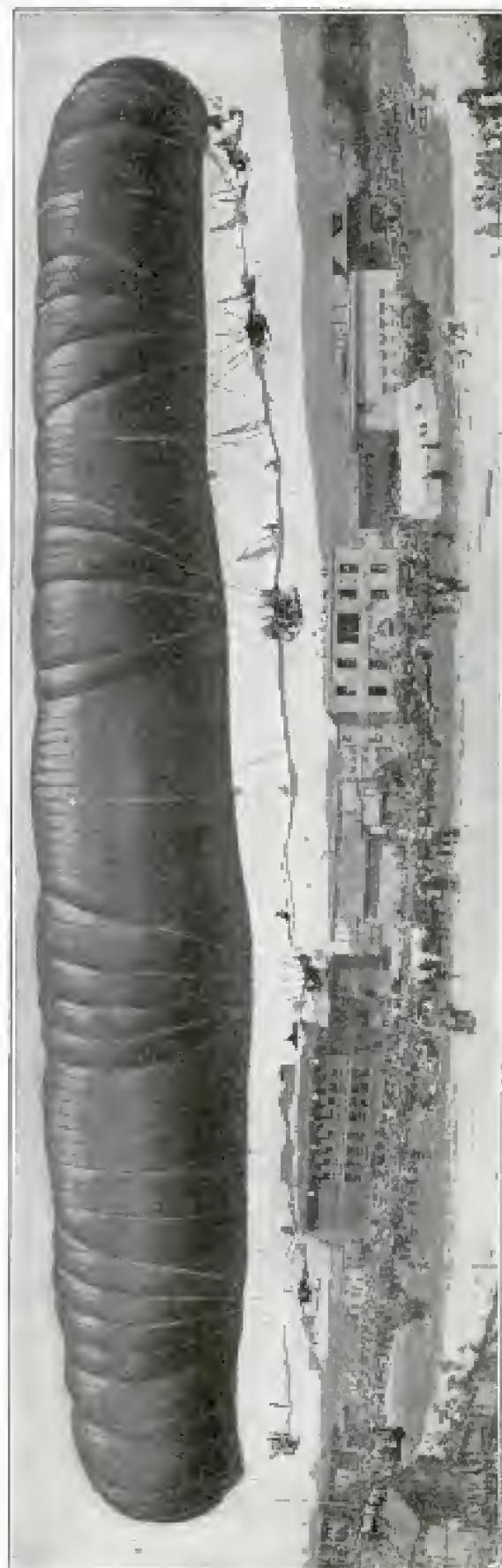
## HUGE DIRIGIBLE BALLOON COLLAPSES

**Immense Gas Bag Bursts at Height of 300 Ft.—Sixteen Persons Hurled to Earth**

The most ambitious flight of a dirigible balloon ever attempted in the United States, and probably in the entire world, met with disaster at Berkeley, Cal., on May 23, when the Morrell airship, 450 ft. long, collapsed 300 ft. above the earth, hurling its 16 occupants, by far the largest number ever attempting a flight in an airship, to the earth in a maimed and bleeding mass. Nearly all were seriously injured, receiving either broken limbs, internal injuries, or both. C. A. Morrell, the inventor, suffered a broken leg, a dislocated hip and internal injuries. Captain Penfield, well known as an Australian aeronaut, who made the flight against the wishes of Inventor Morrell as a stowaway, was dragged out of the wreck with both legs broken at the ankle.

It was estimated that not less than 15,000 people witnessed the ascension, collapse and fall of the dirigible airship. So many were hurt, so serious were the injuries, and so great the menace to those who stood near the point of ascension, that women became hysterical or fainted in the excitement.

The first trouble was encountered just before the flight upward was taken. Morrell had difficulty in getting his men to hear orders, and the airship wobbled dizzily from its guy ropes and anchors. One end of the bag appeared full and distended, but the other end sagged inward and appeared to be of uncertain quality. Finally the long cigar-shaped stretch of canvas straightened out evenly and appeared to swim into equilibrium. Morrell dropped his hat as a signal to let go and the men below began to loosen the ropes. There was some irregularity noticeable in the doing of this and one end of the ship shot upward considerably in advance of the other. The airship continued to rise—a strange-looking engine of flight with the crew clinging to the canvas keel swinging from the mesh of the gas bag.





Left Hand View Was Taken a Moment After Rupture of Bag: Note Partial Collapse

At a height of 300 ft. there was a sharp crackle of the bag, and a lengthwise rent appeared near the center. The forward end crumpled up like paper, and the whole assemblage of balloon, engines and occupants shot toward the earth. The flight upward and the fall to earth again took no more than 5 minutes.

A horrifying medley of shouts and shrieks from the thousands of people clustered about rent the air as the airship was seen to collapse. For a moment it seemed that the ship and its weight of engines would fall directly into the mass of women and children that crowded every available inch of space, but they marvelously escaped.

The diameter of the gas bag was 36 ft. and when filled with the 485,000 cu. ft. of gas which it contained when the flight commenced, had a lifting capacity of at least 6 tons. Morrell describes the ship as a combination of the aeroplane and the dirigible balloon. Below the huge canvas bag was a keel upon which were mounted five 60-hp. gasoline engines. These engines were placed 60 ft. apart, and each operated a combination propeller and an aeroplane. Each engine had a special engineer. The propelling fans or aeroplanes, as the inventor called them,

were made of light wood, the blades covered with oiled silk. Two blades on a side were operated by each engine.

The gas bag was not silk, the material generally used in the manufacture of balloons, but a sort of unbleached cotton canvas, covered with a coat of paint or varnish, and it is generally believed that it was the weakness of this material which caused the collapse.

Three theories were advanced as to the immediate cause of the accident. These were that one of the engines was improperly placed and caused derangement of equilibrium, that a guy rope was not cast off simultaneously with the others and cut through the gas bag, and that the bag was improperly inflated.

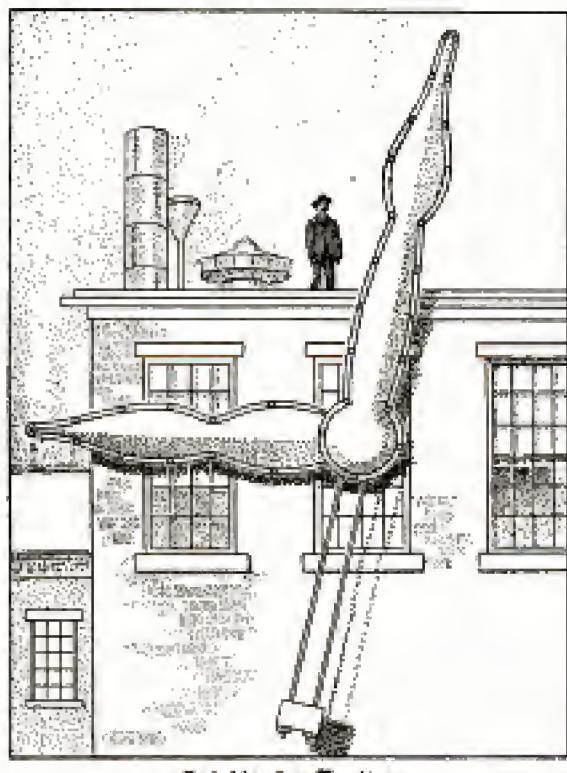
Colonel Postnikov, formerly an officer of the Russian army, at present living in Berkeley, predicted the disaster several days before the flight. During the Russian-Japanese war he was in charge of the balloon corps at Vladivostok. His reason for such a prediction was his belief that the material used in the construction of the gas bag was not strong enough to hold the volume of gas forced into it.

Inventor Morrell estimated his loss at \$40,000.

## THE LARGEST CLOCK IN THE WORLD

"Big Ben," the clock on the tower of Westminster, which for years held the record as the largest timepiece in the world, and the clock on the Philadelphia city hall, which wrested the honors from "Big Ben," both pale into insignificance when compared with the clock which has been erected in Jersey City.

The illustration gives a clear idea of its immensity, but the figures will still add to the impression. Its area exceeds 1,100 sq. ft. and it has a diameter of 28 ft. as compared with the 25 ft. of the Philadelphia clock and the  $22\frac{1}{2}$  ft. of the English clock. The minute hand measures  $18\frac{1}{4}$  ft. and will travel at its point 23 in. every minute, or over half a mile every day. The weight of the minute hand and its counterpoise is nearly a third of a ton and the total weight of the timepiece is approximately 6 tons. In fact, the clock was so large that the makers found it necessary to construct the hands outdoors, and in the illustration they are shown fastened to the outside of the factory building.

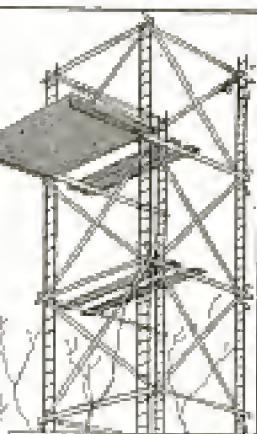


Set Up for Testing

At night the hands and numerals are outlined with electric lights so that the time can be seen from several miles distant.

## LANDING ON HANDS AFTER 66-FT. DIVE

For some reason the French seem to have a monopoly on the "thrillers," as all dangerous and difficult feats are known to the amusement professions. Every year when spring ushers in the circus, the "Big Thriller" of the season is "Mon-



sieur" this, or "Mademoiselle" that, in "The Leap for Life," or some other equally hair-raising act.

The dramatic, almost hysterical temperament of the Parisian is always demanding something of this nature, and to fill the craving some new "thriller" is devised in Paris almost every day. One of the latest is the performer shown in this illustration. He dives from the scaffolding and drops 66 ft., landing on his bare, unprotected hands.

## AIRSHIPS TO SUPERSEDE BATTLESHIPS

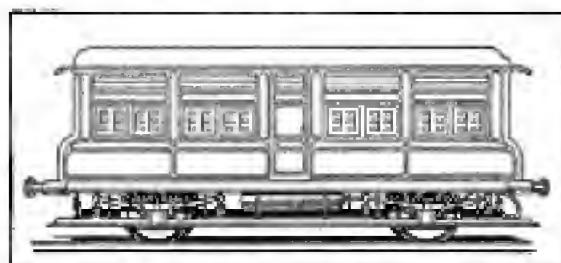
According to the extravagant prediction of Maxim, the inventor, at a banquet given in New York, half a dozen battleships cannot be completed before the demand for them will be gone.

"In the not distant future we shall have our automobile of the air and in the wars of the future we shall have our aerial battleships, cruisers, torpedo

boats and torpedo boat destroyers," said Mr. Maxim, in his address. "They will be airy, frail and fairy craft, indeed, compared with the grim steel monsters of the sea, but the explosives they will be able to drop will be effective."

INDIAN RAILWAY INSPECTION CAR

The Bengal-Nagpur railway has turned out two of these cars for the

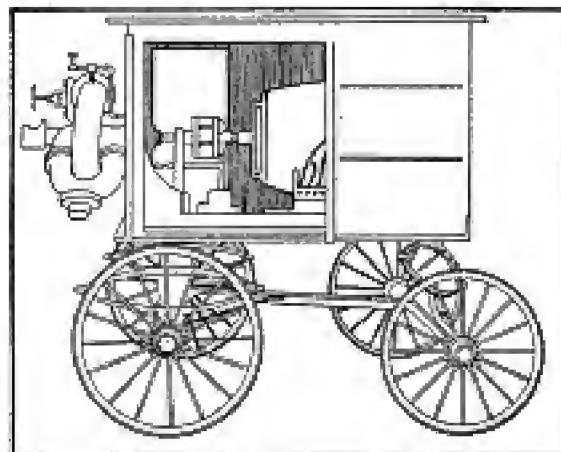


Slats Instead of Windows

use of inspection parties, which usually consist of division superintendents and consulting engineers. The unsightly sun shades which ordinarily cover the sides of Indian railway cars have been displaced by wooden bonnets or slats. At each end of the car is a large observation window.

PORABLE MOTOR-DRIVEN PUMP

An interesting electrical portable pump is being used by an electric light company in Omaha for pumping out the manholes of its conduit system. The power is supplied by a direct-

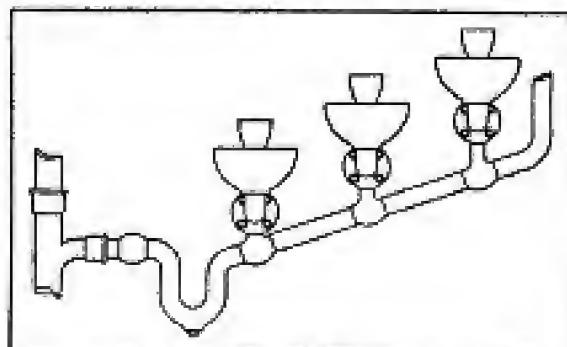


Portable Electric Pump

current 10-hp. motor. A flexible connecting cord 200 ft. long, one terminal of which is permanently connected through the axle to the starting box, and the other to be connected to a convenient source of electricity, which is to be found either in a manhole, in case of making connection with the underground system, or at a feeder or main junction box, in case of a pole line.

FLOWING DRINKING FOUNTAINS FOR SCHOOLS

The problem of furnishing drinking water in public schools has long been a bone of contention among boards of education and school commissioners all over the country. It is conceded that the use of a cup or glass is unsanitary and that germs of disease are often transmitted by one pupil to others by this method. Probably the best remedy is the flowing pedestal fountain, which practically eliminates the possi-



The Water Runs Constantly

bility of the transmission of germs in this way. The water continually running during the hours when the pupils are using it keeps the cup covered and always clean. The lips only come in contact with the running water and do not touch the metal.

The illustration shows one of the fountains with cups arranged for pupils of different height.

Germany is experimenting to determine whether or not a vertical shaft of light can be seen a greater distance than a horizontal flash, with the idea of so equipping its lighthouses, if such proves to be the case.

## THE COTTON SEED OIL INDUSTRY

In the great cotton belt of the south are 848 mills engaged in crushing cotton seed for its oil and other products. In these mills are 2,608 presses and in connection with them 2,752 ginstands and 3,126 linters. It is estimated that in the production of cotton seed oil and by-products more than \$85,000,000 is invested.

The mills annually use about 4,000,000 tons of seed, costing about \$60,000,000. When made into oil, cake, hulls and linters, and other products, its value is about \$90,000,000. At the present time but little more than half the total seed product of the country is crushed.

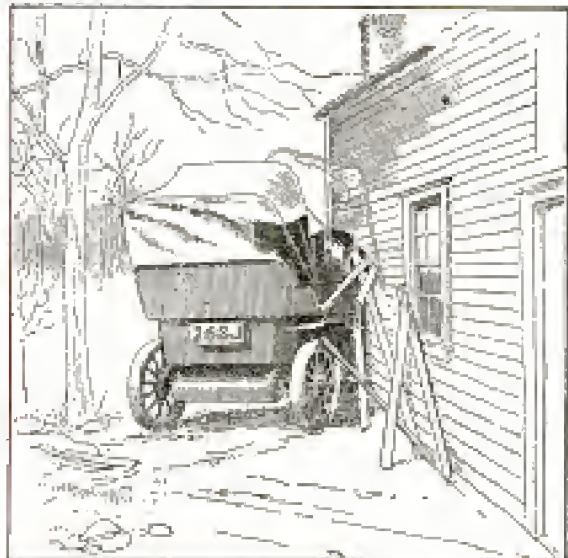
• • •  
NEW YORK'S \$3,000,000 POST-OFFICE

The great feature of New York's new postoffice building, which is to cost at least \$3,000,000, is the successful work of the architects in giving it the monumental character a government building of such importance should possess, without interfering with the practical purposes to which it is to be put. The principal facade will consist of a row of Corinthian columns terminated at the north and south ends by pavilions containing niches.

When completed, the building will be the largest and finest of any in the world used for similar purposes. It will be three stories high and will have 114,373 sq. ft. of floor space. The great postoffice in London, England, has only 101,000 sq. ft. of floor space.

## AUTOMOBILE WRECKS SIDE OF HOUSE

Following a disastrous encounter with a herd of cattle on a country road, an automobile owned by a Trenton, N. J., family, and occupied by two women and a chauffeur, ran into the side of a house and tearing through a

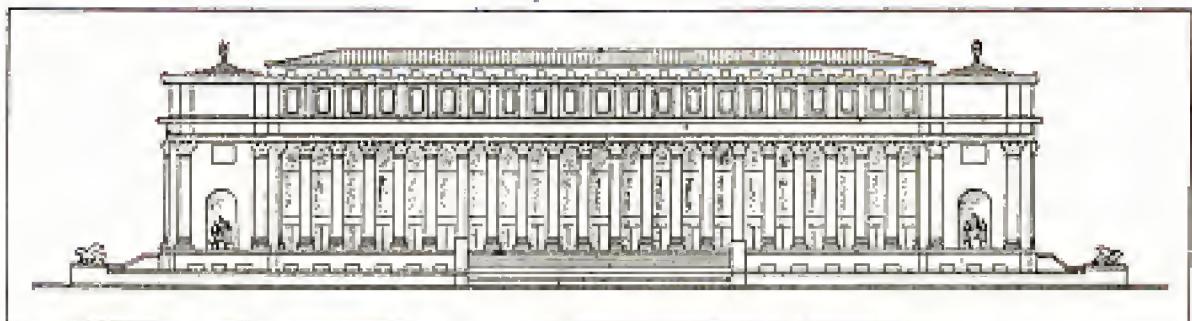


A Double Wreck

wall gained partial entrance to the parlor.

The accident was primarily the result of too many cattle. The chauffeur had succeeded in dodging the majority of the herd when two of the animals blocked the entire road. One of them was struck and the shock threw the steering gear out. The next moment the occupants of the machine were gazing into the interior of the dwelling, but luckily escaped without injury.

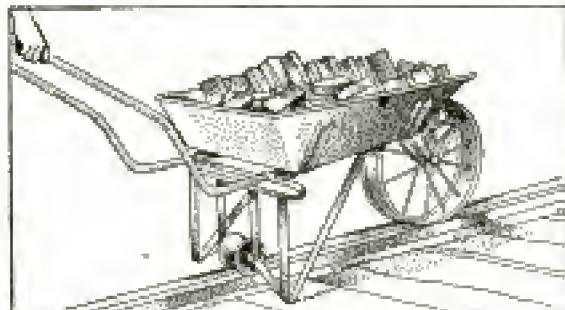
• • •  
One ounce of eggs will produce 39,000 silk worms.



As New York's New Postoffice Will Appear

### MONORAIL WHEELBARROW

This monorail wheelbarrow is designed for use in yards interspersed with railway tracks. When being

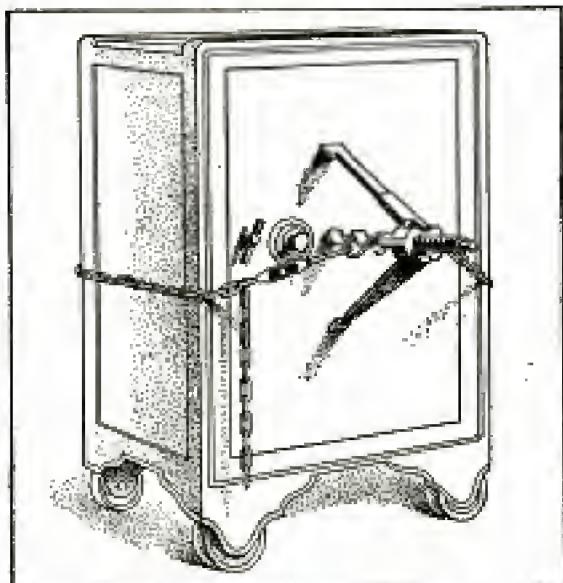


Will Carry Heavy Loads

pushed along the ground it runs on the large forward wheel as does any ordinary wheelbarrow. On the rail, the small grooved wheel comes into play and relieves the workman of the task of lifting. He simply walks along behind and pushes and balances it.

### BURGLAR'S SAFE-DRILLING DEVICE

Among other burglar's tools found in the possession of two men captured while breaking an entrance through the partition of a pawnbroker's shop was this cleverly devised instrument for drilling open a safe door. The two legs and the chain act as a brace through which the drill is turned, boring its way into the steel.



Burglar's Safe-Cracking Outfit

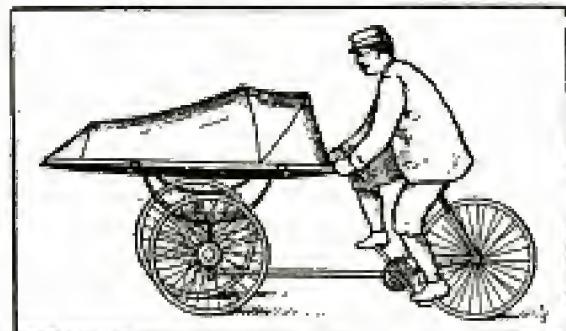
When discovered, the safe-breakers were barricaded in the cellar, but were quickly driven out by burning cayenne pepper.

### THOUSAND ALLIGATORS CROSS CONTINENT

One thousand alligators, ranging from young animals no longer than a lead pencil to monsters that could crush a man in their jaws, have been transported across the continent from the southwestern corner of Louisiana to East Los Angeles, Cal., where an alligator farm was recently started. None died in transit, although 10 days on the way.

### TRICYCLE AMBULANCE

The tricycle ambulance shown in this illustration is the invention of a French army surgeon and is for use



Army Tricycle Ambulance

on the battlefield and in large industrial centers where accidents are numerous. The hood is canvas and can be turned back to make an opening for fresh air. It is claimed that it rides much easier than the regulation wagon ambulance and is not so wearisome to the injured person.

### NATURAL GAS CAPRICIOUS

A Kansas gas man who has spent years in the business makes the statement that natural gas is capricious and that men who have studied it all their lives give up in despair when it comes to explaining the whys and wherefores of some of its ways.

For example, a steady northwest wind will reduce the pressure of natural gas at least 25 per cent at the wells, and the pressure is always reduced between the hours of 7 and 9 in the morning. "I have examined many pressure sheets and always found this to be the case," says the man from Kansas, "and even geologists shake their heads and cannot give a reason."

### "THREE-BALL" GASOLINE TESTER

One of the simplest devices for testing the specific gravity of gasoline is the tester shown in this illustration. The balls are colored red, white and blue, and are of different weight. The tube is dropped into the tank, barrel, or can, and the fluid enters through a  $\frac{1}{4}$ -in. hole. Each ball sinks or floats, according to the density of the gasoline.



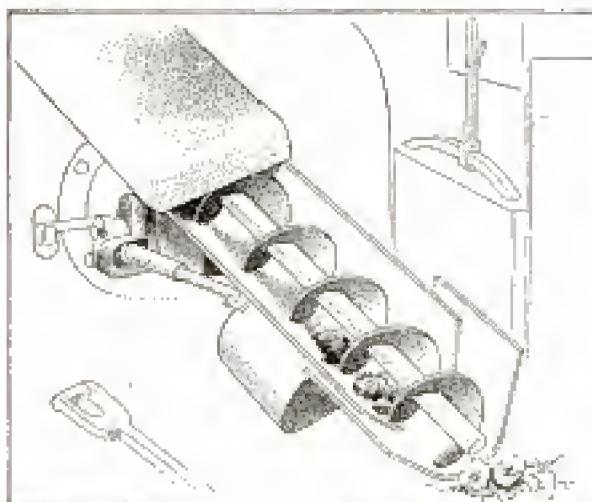
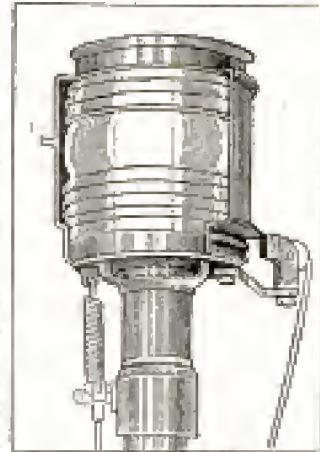
### MECHANICAL STOKER FOR LOCOMOTIVES

The mechanical stoker shown in this illustration has three parts. The first is the chute which transfers the coal from the tender to the fire door, the second is the screw conveyer which carries the coal into a receiving hopper

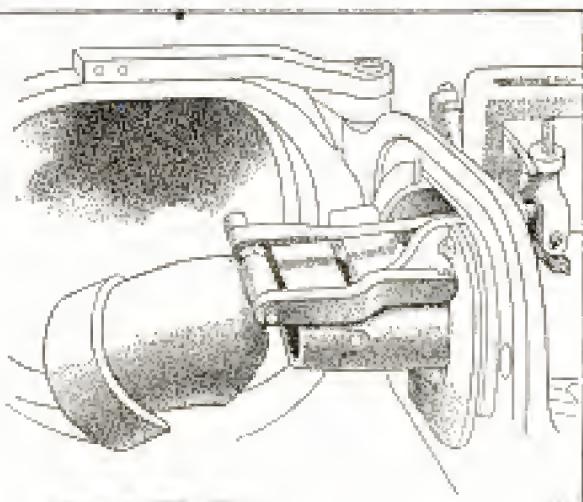
in the door of the fire box, and the third is the distributor, which is a set of rapidly revolving steel blades within the hopper. The conveyer discharges coal at the required rate into the receiving hopper, the blades gather and discharge it through a round nozzle or deflector, and the deflector moves from right to left, guiding the fall of coal over the fire box, not in a shower, but in one place at a time until the entire grate is covered.

### NIGHT SIGNALING AT SEA

By the use of a regular marine lamp, equipped with a patent device for flashing the light, the Morse code is used for night signaling from vessel to vessel or to the shore. The flashes of light correspond to the dots of a telegraph instrument, and are made by working a lever which connects by a wire or light steel rod with the flasher. Nearly all ocean liners, including the "Lusitania" and "Mauretania," are now equipped with this device or similar ones. These two vessels, by using a red light, even flash signals during the day while at anchor in the Mersey.

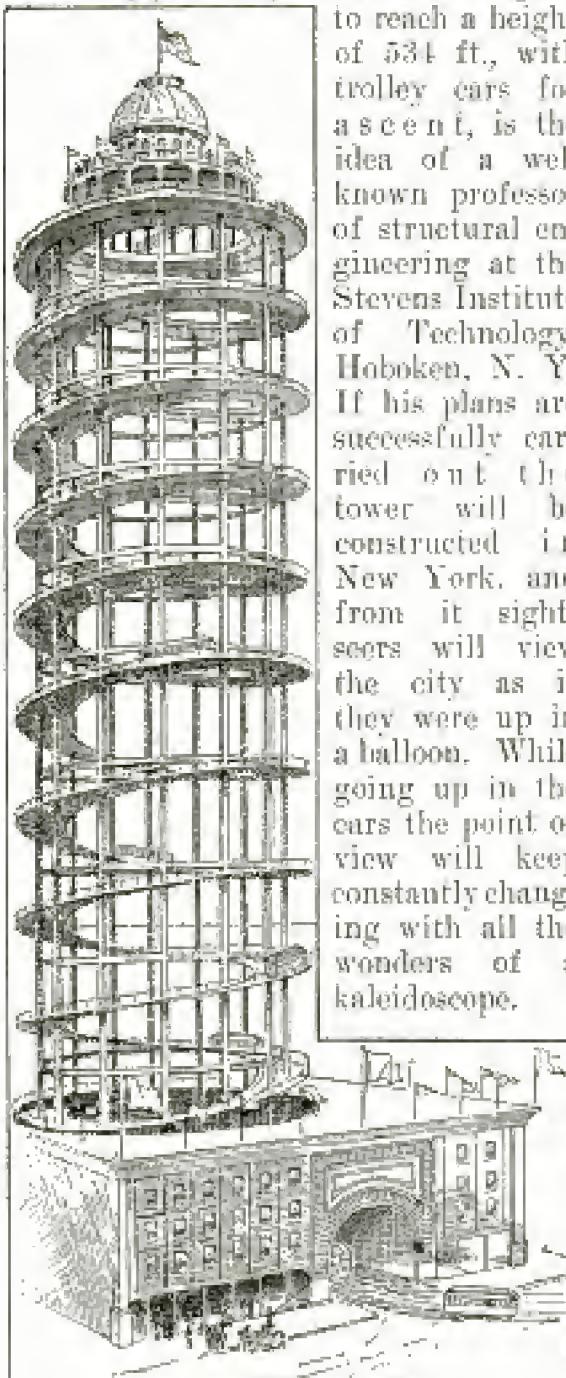


Locomotive Stoker Which Scatters in Feeding



### "SEEING NEW YORK" FROM HUGE TOWER

This gigantic spiral tower, designed to reach a height of 534 ft., with trolley cars for a ascent, is the idea of a well known professor of structural engineering at the Stevens Institute of Technology, Hoboken, N. Y. If his plans are successfully carried out the tower will be constructed in New York, and from it sightseers will view the city as if they were up in a balloon. While going up in the cars the point of view will keep constantly changing with all the wonders of a kaleidoscope.



Proposed Trolley Tower

### GIGANTIC ELECTRIC SIGN WEL-COME'D FLEET

When the great American "Battle Fleet" approached the Golden Gate after its long trip around South America it met the glare of the largest electric sign ever erected in any part

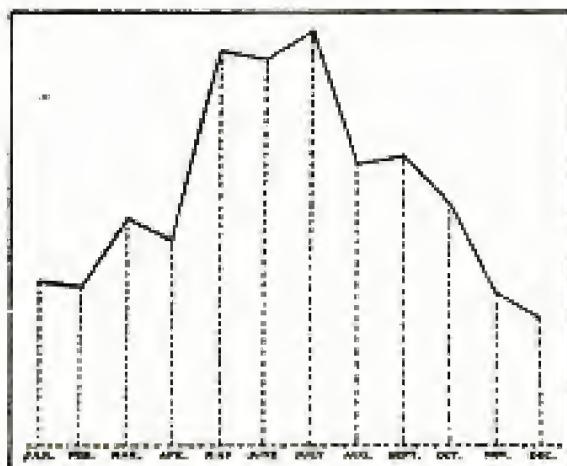
of the world. The huge framework stood at the top of Telegraph hill and bore the word "Welcome" in letters 50 ft. high and averaging 38 ft. wide. The total length of the sign was 400 ft., and 18,000 ft. of  $\frac{1}{4}$ -in. galvanized iron wire was required to properly brace it. Over 20,000 electric light bulbs were used in forming the letters. The amount of lumber used was 48,300 ft.

When illuminated, this mighty symbol of San Francisco's hospitality was visible 30 miles out at sea.

### WHY WATCHSPRINGS BREAK IN JULY

In looking over his watch repairing records for the past 10 years a Wisconsin jeweler found that 449 watchsprings broke during the warm months of May, June, July, August and September, and only 244 during the colder months. Of the warm months July holds the record with 94 breaks.

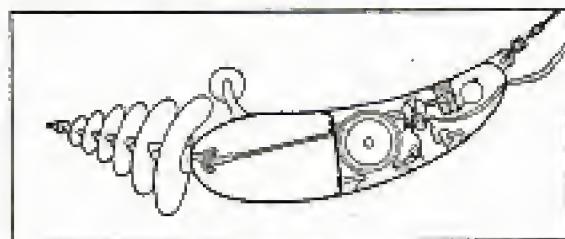
"We know that upon filing the surface of a block of tool steel and then rubbing it with the hand, the surface becomes hardened so that upon filing the steel again the file does not bite readily," says the jeweler-scientist. "The fact above mentioned leads me to believe that during excessively warm and sultry weather there emanate from the body certain substances which have an effect upon the already hardened steel spring similar to that cited above."



July Hard on Watchsprings

## MACHINES TO BURROW UNDER SUNKEN VESSELS

A self-propelled apparatus for burrowing underneath a sunken vessel, and carrying a rope with it, has just been patented by two Italian inventors, who claim that it can be started into the sand on one side of a vessel and will worm its way out on the other side, executing a half circle.



A Mechanical Worm

The machine consists of two propellers or screw augers, set at an angle to one another and driven by a small motor. All the mechanism, with the exception of the augers, is protected by a steel casing. Electric wires connect the motor with the surface, and these and the rope follow the machine through the hole it bores. The machine was designed for the salvaging of ships imbedded in sand in the same manner as the "Principessa Yolanda," the Italian ship which sunk immediately after being launched. The fact that this ship sank deeper and deeper in the sand as the salvage work progressed gave the Italian inventors their

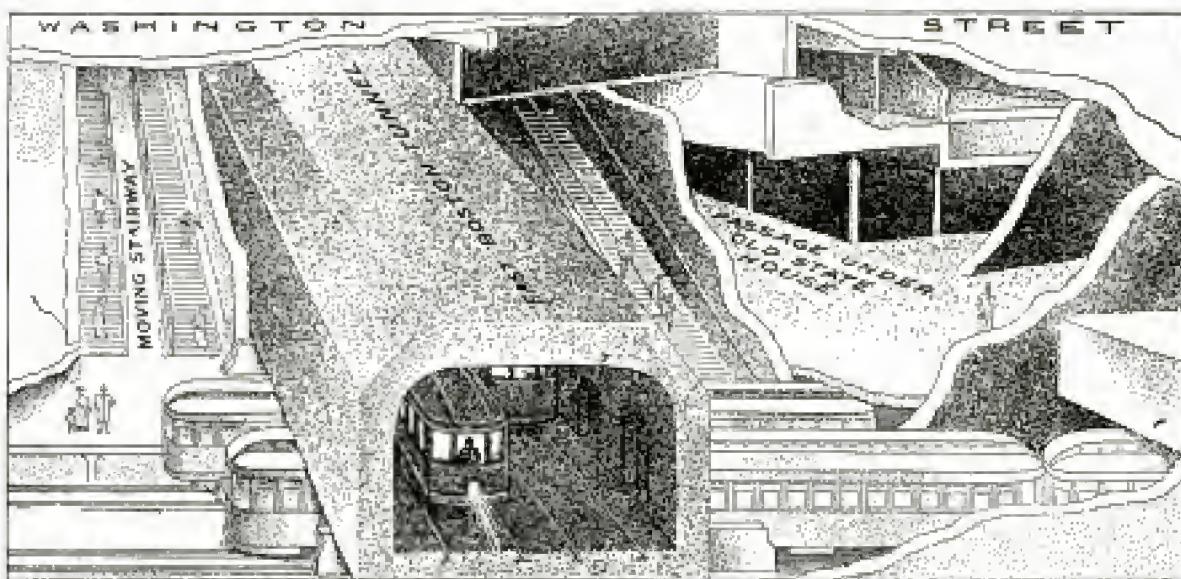
idea, and they claim that with the invention they can get heavy hawsers under ships similarly imbedded and minimize the work of raising them.

## EXTERMINATION OF RATTLESNAKES CAUSE OF WORSE PESTS

One of the most destructive pests Californian grape growers have to contend with is the "kangaroo rat," a little animal slightly larger than a mouse and smaller than the ordinary rat. During the early months of this year they appeared in hundreds in the vineyards around Ben Lomond mountain, California, and fed on the young buds of the vines. The cause of their appearance in such numbers is attributed to the recent wholesale slaughter of rattlesnakes in that neighborhood.

## A TUNNEL UNDER A TUNNEL

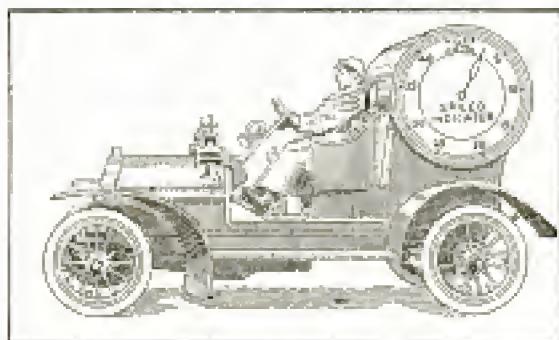
In Boston's complicated subway system it was found necessary to run one tunnel under another at Washington and State streets. In doing this the floor of the East Boston tunnel constitutes the roof of the Washington street tunnel, and great steel girders, embedded in concrete, straddle the lower bore and give support to the flooring of the upper one. The crossing occurs just under the old historic state house.



Where One Tunnel Passes Under Another

## BIG SPEED INDICATOR

An English firm, following the lead

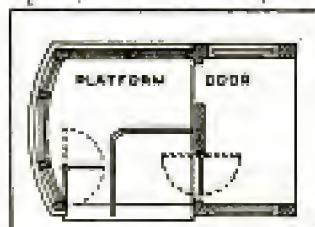


To Teach the Public

of the American firm which built a giant auto-meter and ran it through all the cities of the United States to demonstrate how slow 10 miles an hour actually is, has constructed one of somewhat similar design for the same purpose. Not only will it demonstrate the pace inside of which an automobile must run to keep within the speed limit, but it will run alongside other vehicles to show the public that an automobile at only 10 miles an hour is running much slower than many other vehicles uncomplained of.

TURNSTILES FOR STREET CARS  
AN ABOMINATION

In discussing a turnstile for street cars recently invented by the manager of a traction company in Shreveport, La., a well known traction expert of Chicago says that any type of turnstile for such a purpose is impracticable. The principal feature of the Shreveport invention is that the arms only make a quarter turn and then are automatically returned to their original position by a set of springs in the base of the turnstile. This is necessary, because, with the limited space available on a car, the usual type of turnstile could not be used. The registering device is set on the top of the stationary stile standard.



## THE DEATH SPECIAL

The special has always been the monarch of American railway trains, for whose passing all other trains, whether slow ponderous freights or luxurious trans-continental flyers, take to the sidings in abject subjugation. But of all specials the "Death Special" is the most autocratic. In the phrasing of Railroad Men, it is the swift flying messenger of love, carrying hopes and fears at 60 or 70 miles an hour toward the bedside of the dying. It is "the death special" because so often, after hand and brain and the cunning workmanship of the two have been exhausted, death is found to have won in the race that may have been across a continent.

The passenger department feels the first pulse of the call for the death special. It is a business proposition in the first 30 minutes. Who wants the train? Can he pay for it? Is the order O. K.?

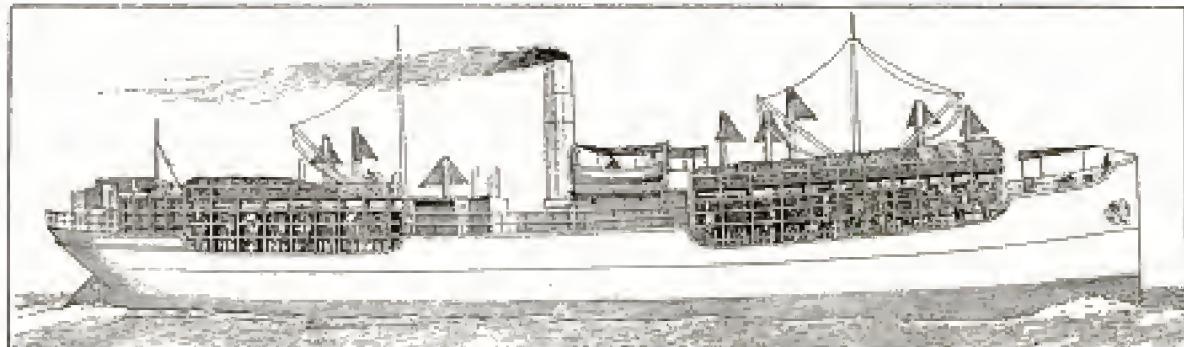
Two hours for assembling a death special with steam up is sharp work. Ordinarily more time is needed for the passenger to get in readiness than is required by the railroad company. The head of the operating department receives the first call for the death special and with the call comes the reasons for the run. At once the general superintendent faces the question of time. He makes a hurried calculation of distances between given terminal points and blocks out in the rough the time necessary for the run. The division superintendents are notified, and the chief dispatchers set to work arranging a new schedule that is to take into consideration every station and every side-track on the whole system over which the flyer is to speed. The first duty, however, is to call up the master mechanic or the roundhouse foreman at the terminal from which the special is to be made up, asking for the train to be in readiness at a certain minute.

There is a thrill in the call of the death special that permeates through the entire system from "the old man"

down to the crossing flagman. All conditions are alike to the crew of such a train. Momentum is all that counts. Towns, cities, bridges, sage brush and cultivated fields are one in the landscape. The engineer knows every grade, every station, every culvert,

### CATTLE PENS ON SHIP'S DECK

In transporting cattle from southern ports to Cuba the decks as well as the holds of the cattle ships are filled with pens. On this ship 3,000 cattle are stowed away like sardines in a can. The



Double-Deck Cattle Pens on Shipboard

bridge and switch on his division, and for an average of 225 miles he and his conductor will have the duty of safely sending the special through space.

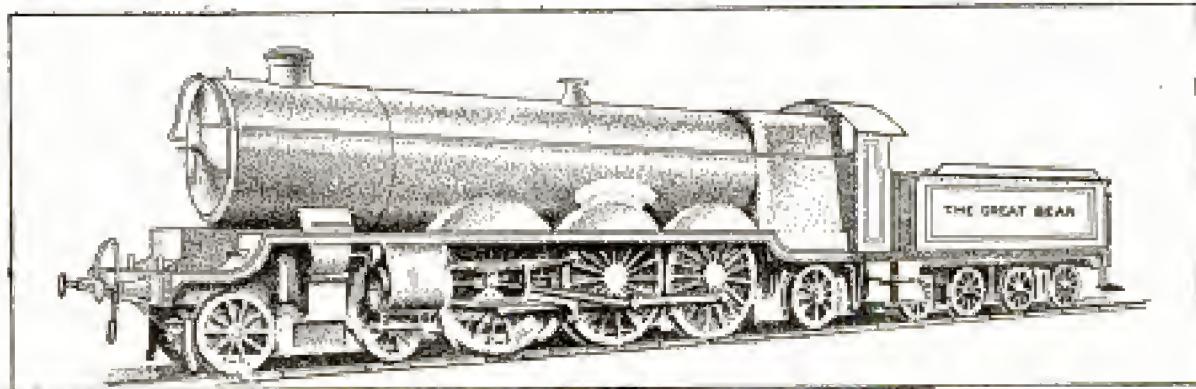
In the office of the chief train dispatcher the burden is heavy. His eye is on the train from the moment it leaves the starting terminal until it is housed safely in the sheds at the end of his division. Every train that is met or overtaken by this flyer must have orders concerning its rights over everything. If the special runs behind time additional orders may have to be made out for every one of these opposing trains.

It is on the engineer that the runs depend. He feels it as an engineer and as a man. Pride in his work and his own self-respect are at stake with him. And over all of this is the inspiration of having a task before him to which all of his ambition rises.

peculiar looking objects sticking up above the pens are ventilator funnels. When in a heavy sea the struggles of the caged cattle often make the ships roll uncomfortably.

### ENGLAND'S LARGEST LOCO-MOTIVE

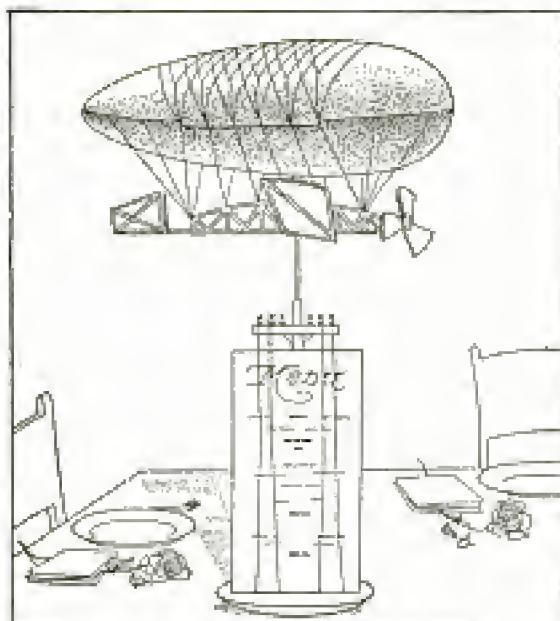
The huge engine just installed in service on the Great Western railway of England is by far the largest in size and weight of any in that country. It is of the Pacific type and is called "The Great Bear." Unlike locomotives in this country it is gaudily painted, the body, tender, and wheels being green, and the bumpers red. Its name is carried over the center driving-wheels in gilt letters. The tender carries 3,500 gal. of water and 6 tons of coal.



The Largest Locomotive in England

## MECHANICAL MENU CARDS

At a recent banquet of an aeronautic club the menu cards were fashioned



A New Idea for Banquets

after this pattern. As is seen in the illustration a pasteboard form of a dirigible balloon is held suspended upon the top of a telegraph pole made of the same material, and from the crosspiece of this pole hangs the card upon which is engraved the names of the different dishes served. The idea is a good one and by following it out appropriate menu cards can be made for any kind of a banquet.

## SIXTY MILES OF LOGS

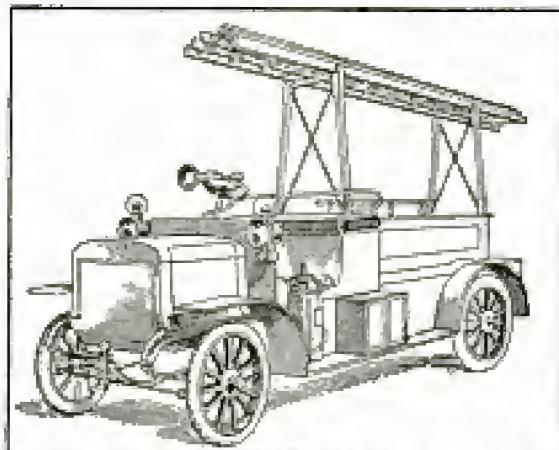
The largest raft of logs ever towed from Nova Scotia to Boston was composed of enough logs to reach 60 miles, if placed end to end. It was composed of 7,000 logs rafted together in a mass 400 ft. in length, 50 ft. wide and 28 ft. in depth. It floated with 10 ft. of logs above water and 18 ft. submerged.

The construction was vastly different from the style of raft in which the logs are fastened in

booms and all float on the surface of the water. It was made up in 10 sections, averaging about 40 ft. in length, each independent of the others, but all welded into a unit by a heavy iron chain running through the center from bow to stern. Each section was fastened by wire cables running across the logs from stanchions placed at each side. Additional cables extended from maple girder ties placed on top of the raft down through the logs and around the bottom layer, holding them securely together.

## A BRITISH AUTO FIRE ENGINE

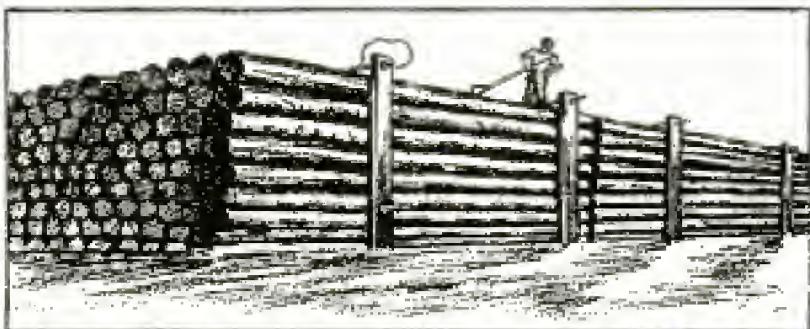
One of the latest types of English automobile fire engines is here shown. It carries a pair of light ladders on a framing over the body of the car, and



Motor Fire Engine

is also equipped with chemical extinguishers.

A laboratory for the teaching of electric science has been established in Manila by the Jesuit Fathers.



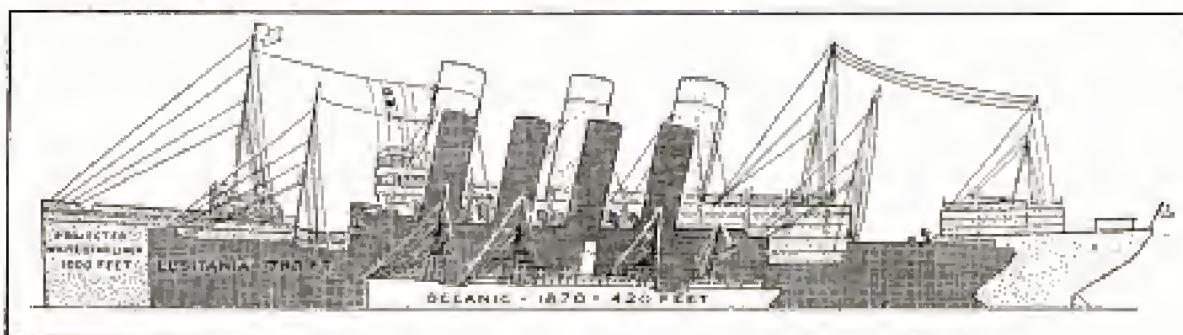
The Logs Extended 18 Ft. Below Water

AEROPLANE RECORD CONTINUES  
TO SOAR

Leon de La Grange, one of the French coterie of aviators, broke the

THE DREAM OF A 1,000-FT. LINER  
TO BE REALIZED

Some time ago word was flashed over the cables from Europe that the



Liner of 1870-420 Ft. • • • Liner of 1910-1,000 Ft.

record for distance in his aeroplane, covering 3,925 metres, or about  $2\frac{1}{2}$  miles, in 6 minutes and 30 seconds. The previous best record was that made by Henry Farman, and was just under 2 miles. Later de La Grange, in another official trial, covered 7 miles in 9 minutes and 30 seconds, circling the field 7 times, but as he lightly touched the ground twice during the flight, the total distance was not allowed.

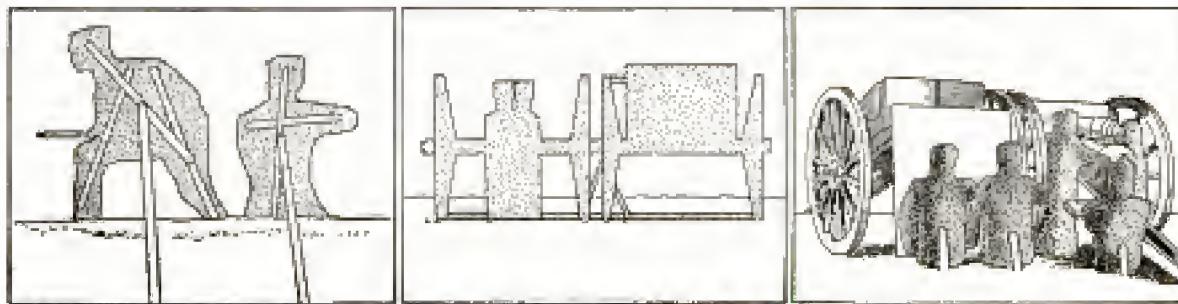
## ENGLISH ARMY TARGET PRACTICE

Among the many improvements now taking place in the English army few are more important than the methods of teaching the art of shooting, both with rifles and guns. The old bull's-eye target has been relegated to the rear in favor of dummy targets which represent more clearly the conditions of war. In the illustrations are shown a rifle target, representing a figure crouching in a trench, and a shielded and unshielded gun used as artillery targets.

White Star Line was making arrangements to construct a 1,000-ft. trans-Atlantic liner. Marine men were skeptical, but a few days later Bruce Ismay, the general manager of the line, arrived in the United States and not only confirmed the report, but added to it the statement that the company was planning to build not only one but two of these giant vessels.

"These two steamships," said Mr. Ismay, "are intended to be far ahead of anything yet designed. They are to be approximately 1,000 ft. in length, perhaps a few feet more or a few feet less, but if not exactly 1,000 ft. it will be but a trifling difference from that figure.

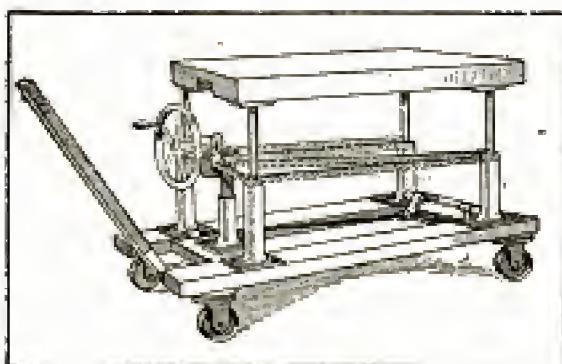
"Extraordinary speed," Mr. Ismay continued, "will not be sought for in these larger vessels. About 20 miles an hour, I should say, will be their gait. There is always a certain percentage of people who are always in a hurry, but we do not believe that that percentage is large, nor is there any reason to believe it is considerably increasing."



Targets Made to Resemble Soldiers

### AN ELEVATING PLATFORM TRUCK

This elevating platform truck was designed for use in a paper mill where it is employed in hauling paper from the machine room to the dry loft. By the mechanism shown in the illustra-

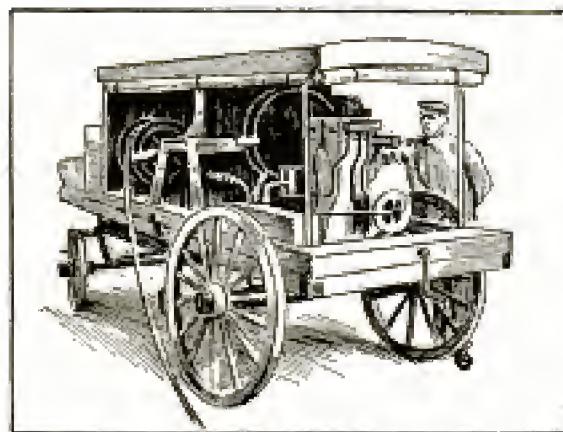


A Handy Outfit

tion the platform is lowered to its lowest point when loading and then raised when the dry loft is reached. The platform can be raised 30 in. and the paper easily slid off and hung. By the old method the paper had to be lifted from the trucks to tables, thus making a third handling necessary and consuming much time. The device has been patented and placed on the market.

### ELECTRICALLY-DRIVEN PORTABLE CABLE WINCH

The German telegraph department is now using portable cable winches driven by electricity for drawing telegraph cables through pipes or cement conduits. A continuous current motor, yielding about 3 hp. is used to operate

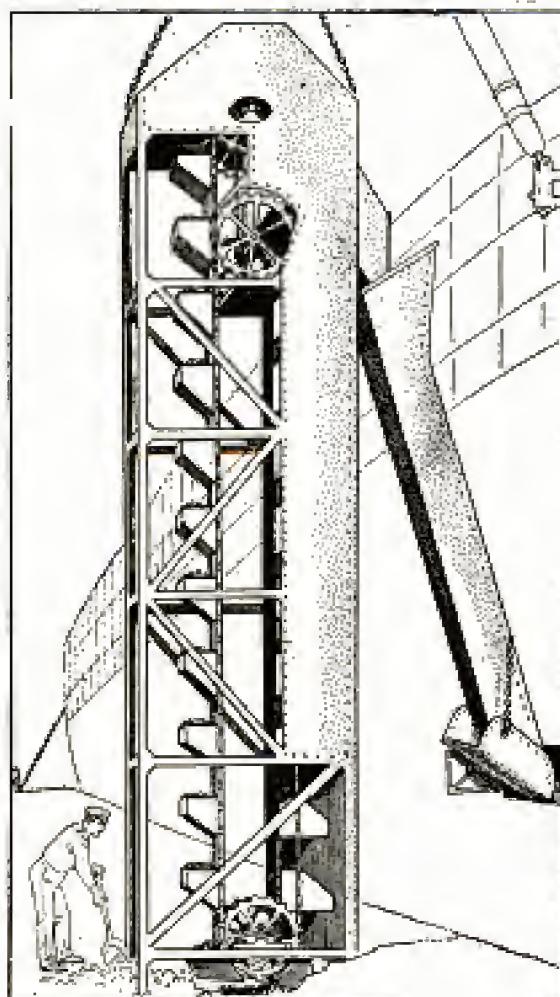


Does the Work of 10 Men

the winch, the speed of which is controlled by means of a starting regulating resistance in 13 stages, which allows the winch to be started at a very low speed.

### APPARATUS FOR COALING VESSELS

An apparatus, consisting of a series of buckets or scoops in endless chain form, driven by a motor, the whole being mounted in a tower, has been added to the many devices for coaling



Ship's Coal Elevator

vessels. The base of the tower rests in the coal, the tower itself being supported and guided by a block and fall gear attached to a boom, and free to move within an area of 25 ft. from the point of discharge. A telescopic chute receives the coal at the top of the tower and discharges it into the vessel. The motor is housed in the upper casing of the tower, where it is protected from injury.

## ENGLAND'S FIRST SKYSCRAPER

The corporation of Liverpool has authorized the construction of an office building 300 ft. high opposite Prince's landing stage on the bank of the Mersey. It will be 21 stories high and the first skyscraper ever erected in England.

## THE JUMPING CARS OF LISBON

Although Lisbon has an electric street car service, the old two-horse cars, or "Americanos," as they are called, have not been altogether displaced. These little cars still run over the electric lines, but as soon as an electric car approaches, have to leave



An Accommodating Car

the tracks to let it pass. They then return to the tracks and continue at a slow pace until again caught.

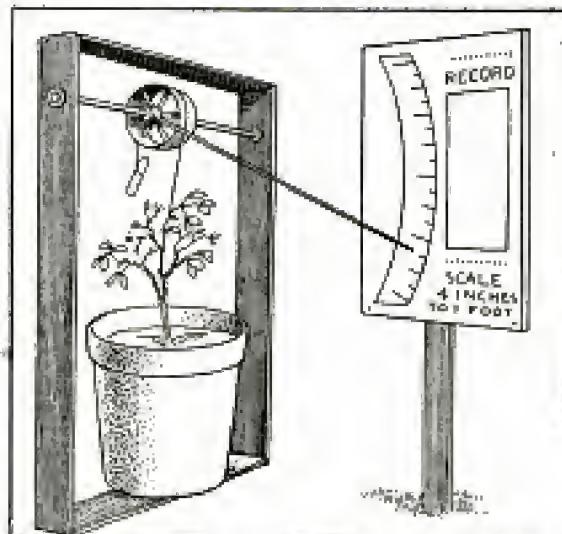
## ELECTRIC LAMP CALL SIGNALS

A set of electric lamp signal calls has been installed in a large Cleveland, Ohio, manufacturing concern, to notify various officials when they are wanted at the telephone. In a conspicuous place in every department is mounted a set of different colored lamps, and over the telephone switchboard in the general office is a similar set. All of the lamps are controlled by switches on the telephone switchboard, and a certain signal, composed of one or more lamps, is assigned to each official.

When a call comes in the operator switches on the proper signal lights and keeps them on until the required official is heard from.

## MEASURING A PLANT'S GROWTH

This apparatus, which can be easily made at home, indicates by means of

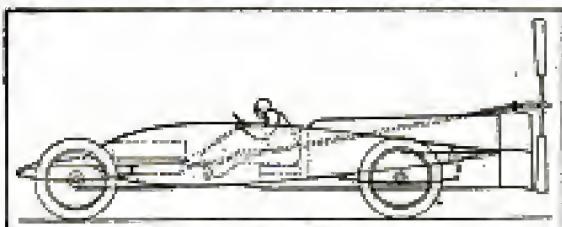


Not Hard to Make

a pointer and dial the exact rate of the growth of a plant. A length of cotton string, or a thin strip of cotton cloth, weighted at one end, is attached to the head of the plant and passed over a wheel. Fixed to the wheel is the pointer. As the plant grows, and so allows the weight to fall, the pointer automatically moves upward along the dial.

## AERIAL PROPELLERS FOR AUTOMOBILES

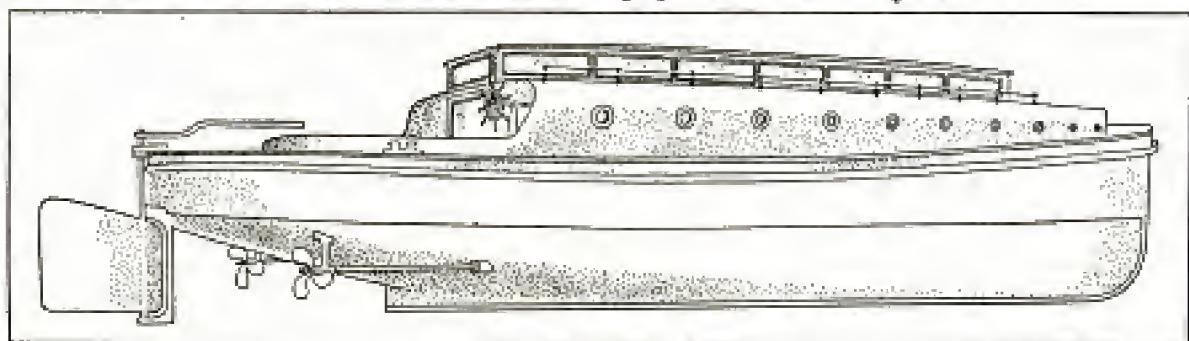
Henry Farman, the man of fame in the aeronautics world, says that few people think of the air as a supporting material, but he maintains that it is almost as solid as the surface of roads when one knows how to make it serve



A "Flying" Auto

his purpose. If he ever leaves his experiments in the air to return to the

to fill the requirements of American physicians for 50 years.



The Steel Hull is Seamless

Courtesy The Automobile

automobile, he asserts that it will be an automobile driven by an aerial screw. The illustration shows his idea of such a machine, and he believes that, weighing no more than 1,000 lb., such a machine could be driven at a speed of nearly 100 miles an hour.

As can be seen by the design, such a car would be composed of two axles, the motor, and the propeller, all assembled on a light but substantial frame. The form of the car would be very much tapered, in order to diminish the resistance of the air, and it would be provided with flat wings. Even with a reduced area, these wings would, Mr. Farman believes, be capable, at a speed of 60 miles an hour, of relieving the car of at least 400 lb. of its weight.

"Certainly such a car," says Mr. Farman, "would be the simplest thing on wheels, and I am sure that it could run faster than any other type of car of the same power."

#### POISON TAKEN FROM LANCE-HEAD VIPER

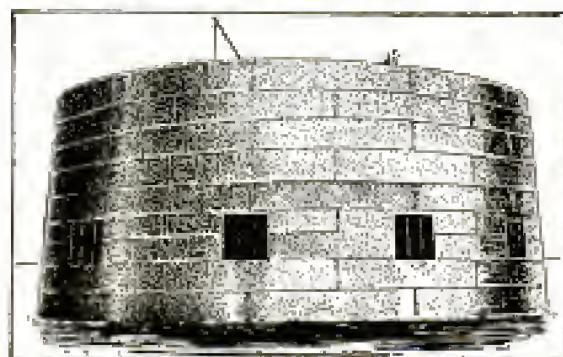
A Brazilian lancehead viper, the deadliest snake in existence, was brought to New York from Brazil recently to have its deadly poison extracted for medical purposes. The poison of the lancehead is a valuable drug, used in cases of mental diseases and insanity. So minute are the particles employed as medicine that no new supply had been received in New York for 18 years, and the supply taken from this one snake is expected

#### ENGLISH SEAMLESS STEEL BOAT

The twin-screw cruising launch shown in this illustration has a seamless steel hull, and is fully equipped for lengthy deep sea cruises. The engine room is amidships and the installation consists of two 15-hp. paraffin engines. Oil storage capacity is provided for a 400-mile run.

#### STEEL CAISSON FOR WATERWORKS INTAKE

This enormous steel drum, 110 ft. in diameter and 25 ft. high, inside of which is a second drum 90 ft. in diameter, is the caisson of the new intake for the Buffalo waterworks. As shown in the illustration, the steel work is finished and ready to be launched and floated to its bed in Lake Erie at the mouth of the Niagara river. The two drums are connected by 12 steel-lined and grated ports, each 6 ft. square, having watertight gates at their inner ends to control the flow of water. The space between the two drums is to be filled solid with concrete.



Steel Waterworks Crib

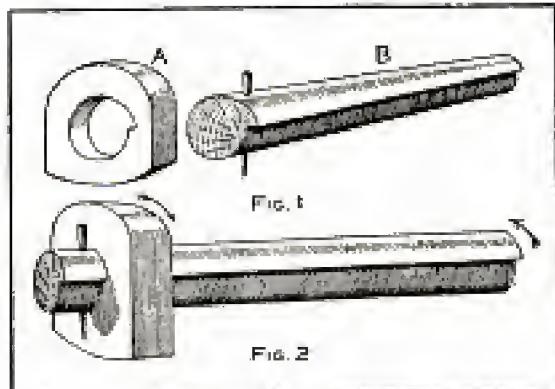


# SHOP NOTES



## How to Make a Carpenter's Wood Gauge

This gauge is made from hard wood with the head cut in the shape shown at A, Fig. 1, with a  $\frac{3}{4}$ -in. hole bored in the center. One-quarter of the circumference of this hole is cut out on a

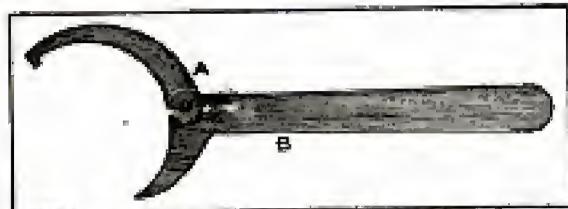


Clamping Wood Gauge

larger arc of a circle forming a notch as shown. The stick B, Fig. 1, is formed to fit this hole made in the head. The object of this construction is: when the gauge is found the head may be set on the stick by giving it a slight twist in the direction of the arrows shown in Fig. 2. The gauge will remain set in the place until changed by a reverse twist of the stick and head.—Contributed by E. H. Haver.

## An Improved Spanner Wrench

The accompanying sketch shows a design of a spanner wrench with an adjustable jaw. This wrench can be quickly made and will prove a handy

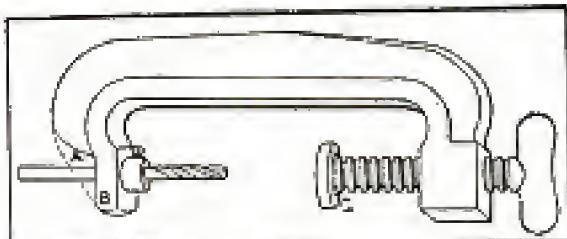


Adjustable Spanner Wrench

tool for turning nuts and hose couplings of various sizes. The large end of the jaw, A, is slotted to fit over the handle, B, and riveted so as to make the joint loose enough to work with ease.

## Home-Made Portable Drill

A quick and simple method of making a portable drill is by taking a large clamp, cutting out a part of the web, as shown at A in the sketch, and then drilling a  $\frac{1}{2}$ -in. hole through the upper jaw, B, through which hole the drill may be placed. A collar with a set screw is made and placed on the drill shank, the collar bearing against the inside of the upper jaw. The drill may be turned with a chuck on a bit



Portable Drill

stock, or a crank may be provided with a set-screw for clamping the drill, which will serve the purpose equally well, says Machinery. The feeding is done by the clamp screw, C. This style of drill may be used in numerous places where no other device could be applied. The clamp can be used for the drill or as a clamp.

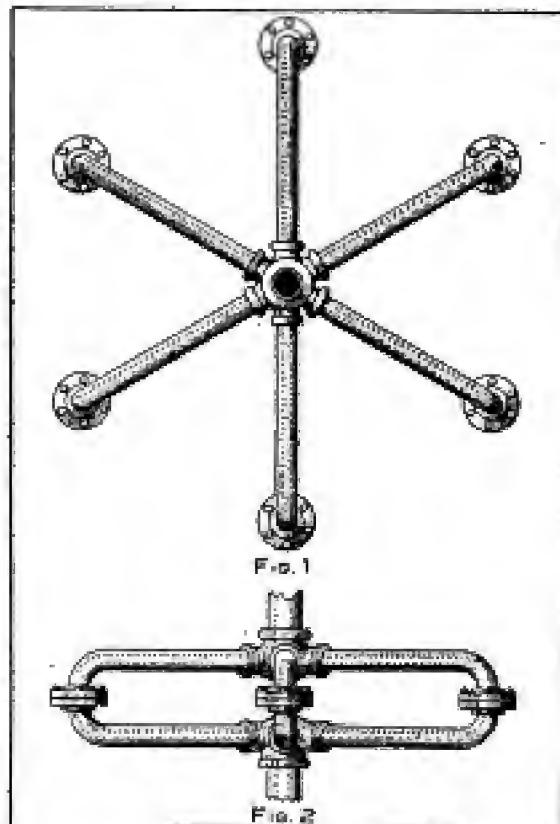
## How to Prevent Bronze Bearings from Running Hot

Flow a mixture of washing powder and water through the oil cups while they are opened as wide as possible, and the machine running light without any load. The fluid as it comes through the bearing will be very black. Run about 1 pt. of this mixture through

and then follow with clear water to wash the bearing out clean. This will make the axle and bronze boxes smooth and eliminate the possibility of new bearings running hot.

#### Exhaust Steam Tank Water Heater

A water heater designed to utilize the exhaust steam and for use in heating water in tanks is constructed as shown in the sketch. This form of heater



Tank Water Heater

has an 8-in. supply of exhaust steam and may be made 10 ft. or more in diameter and 28 in. high, says the Metal Worker. The pipe heating surface is of 4-in. pipe flanged where the two bends meet at the outer ends and has screw joints at the cast-iron hubs. Figure 1 shows the top and Fig. 2 the side view.

When cutting valve seats, if the cutters chatter, fill the teeth with common window putty and bake it hard on a steam pipe. The cutter will then cut true and smooth.

#### How to Set Iron Posts in Cement

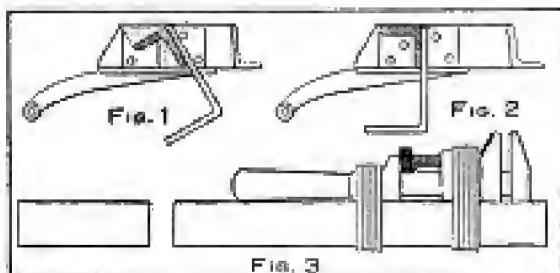
The posts can be made by using old iron pipe from 1 to 2 in. in diameter and 6 ft. long. One end of a common 3-in. drain tile is placed on a board and the pipe is held with one end in the tile and as near the center as possible. A mixture of cement and sand is placed in the tile around the pipe and tamped in tightly. When the cement sets the tile end of the post is placed in the ground. This will make a cheap and durable post.



#### Emergency Repair with a Monkey Wrench

An automobile met with a collision and was left standing along the roadside out in the country, with the cooler and its supporting angle all twisted out of shape. This angle presented an appearance about as shown in Fig. 1, while it should have been straight, as in Fig. 2. To get the automobile running it was necessary to get the cross member straightened. The only available tool was a monkey wrench, says a correspondent of American Machinist.

A wooden bar, 6 ft. long by 3 in. square, was found along the roadside,



How the Wrench Was Used

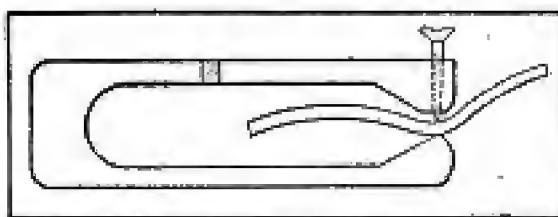
and the wrench was fastened securely to one end of this by means of a wire, as shown in Fig. 3. With this long lever arm on the monkey wrench, the steel angle was straightened easily and the cooler placed in position.

### A Wash for Fire-Brick

Some prefer a mixture of fire-clay and cement for plastering the walls of furnaces and combustion chambers, but it is best to use fire-clay alone, as the heat takes all the water out of the cement, leaving the fire-clay to crumble and fall from the walls. A mixture of fire-clay and salt is good to preserve the walls, says Power, making a glazed surface to which soot will not adhere. Five shovelfuls of fire-clay to one of salt gives good results, but it must be mixed thoroughly.

### Calipers for Irregular Wood Work

The accompanying sketch shows the construction of a pair of calipers to be used on stock with an irregular sec-



Caliper for Irregular Work

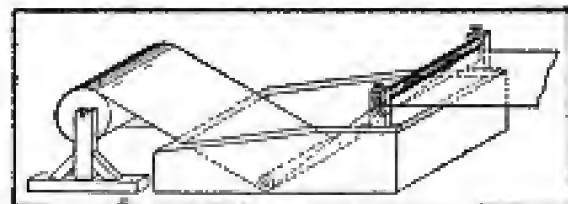
tion, to uniform thickness, says Wood Craft. After working out one side of the stock to templet and roughing out the other side, the calipers, properly adjusted to required size, are applied as shown. Owing to their construction, the arms are permitted to spring considerably, at the same time the screw making a deep scratch on the rough side. By constantly cutting to the bottom of the successive scratches a uniform thickness is readily obtained.

### Painting Car Roof Canvas

Where there is a large quantity of canvas used for roofing purposes it requires considerable time and expense to apply paint to both sides of the material with a brush. The accompanying sketch shows the construction of tub with an old pair of tinsmith's rollers or pipe formers placed on top, the tub being used for the paint, says

the Electric Traction Weekly. There is also a wooden roller in the bottom of the tub.

The canvas is run under the bottom roller and then through the rollers at the top. As these rollers are adjustable

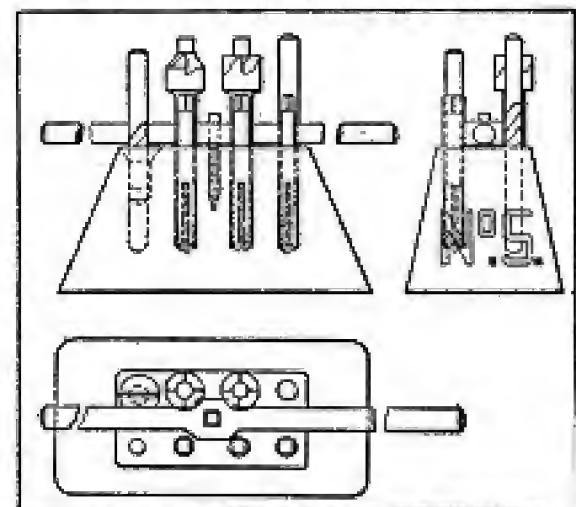


Method of Painting Canvas

with thumb screws the amount of paint left in the canvas can be regulated as desired. A man takes hold of the end of the canvas and walks away as fast as he may and the painting is done much quicker and better than with a brush.

### Block for Holding Taps and Tap Drills

The accompanying cut shows a block which has proved very handy for shop use, says a correspondent of Machinery. It is intended for holding the three taps in the set, one tap drill, one full size diameter drill, one counter-bore, one counter-sink, and a tap wrench. By having the tool-room provided with blocks such as these, when a man wants taps and drills or counterbores for a certain job, he simply asks for block number so and so, and he receives the block with all the accompanying tools. There is a



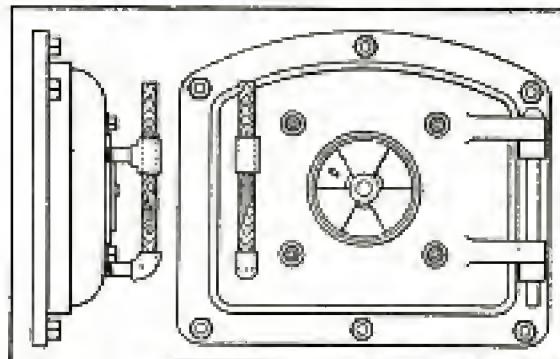
Tool Set Holder

great deal of time saved as compared with such systems where the man first has to ask for taps, and then for tap drills, and finally for the counterbore and counter-sink.

\* \* \*

### A Handle for Boiler Front Fire Doors

The handle on fire doors of boiler fronts consists of a small hook which becomes very hot and the door cannot be opened unless it is lifted with a shovel. If the hook breaks off, a bolt



A Fire Door Wood Handle

is usually inserted in its place. The sketch shows the details of a handle that will remain cool so that it may be handled with the bare hand, says the Practical Engineer. Two holes are drilled in the door, as shown, and tapped for  $\frac{3}{8}$ -in. pipe. Each hole is fitted with a  $\frac{3}{8}$ -in. nipple,  $3\frac{1}{2}$  in. long. A  $\frac{3}{8}$ -in. ell is turned on the lower nipple, and a  $\frac{3}{8}$ -in. tee on the upper one. Place a broom handle through the tee, allowing the end to set in the ell and cut it off as high as the top of the door. This will be high enough so you do not have to stoop to open the door.

\* \* \*

### Waterproofing for Bottle Labels

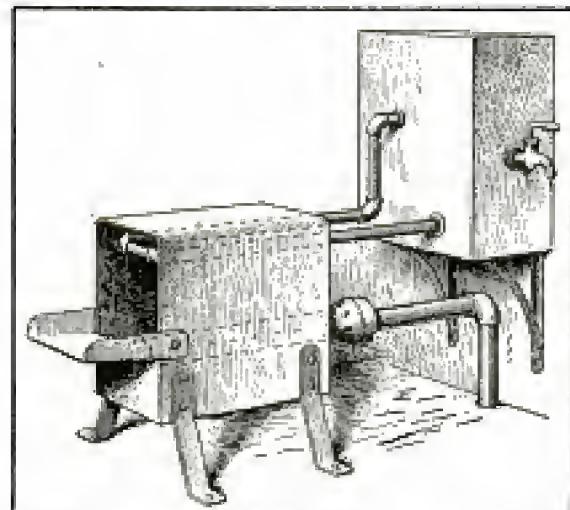
Clean up an old celluloid film and cut it up into small shreds. Place these shreds in a bottle and cover them with amyl acetate, or acetone. After a few shakings and a little time the celluloid will dissolve, says the Photographic News, and give a clear fluid, which

may be brushed over the labels with the aid of a soft brush or a feather. Another useful mixture for this purpose may be formed by dissolving Canada balsam in chloroform.

\* \* \*

### A Soldering Furnace and Water Heater

A great many times hot water is a convenience in the workshop and where a soldering furnace is used an auxiliary water heater may be supplied, says the Metal Worker. As can be seen from the sketch the soldering furnace is constructed of sheet metal and the burner is made from  $\frac{3}{8}$ -in. pipe drilled on the sides, so that the gas will flame at both sides of the coppers that may be inserted for heating. The furnace is 5 in. wide and 7 in. high from top to bottom and 8 in. long from front to back. Just over the burners are supports for the soldering copper made from band iron and riveted to the sides. At the front there is a chute on which the coppers may rest, and this is so constructed that it will also hold a shield to close the front of the furnace when there are no soldering coppers in it.



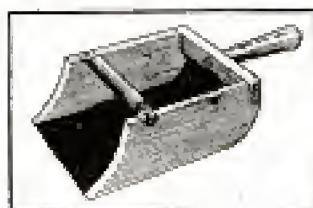
Heating Coil Attached to Furnace

A coil pipe made of  $\frac{3}{8}$ -in. pipe is used for heating the water, and is connected with a 5-gal. tank, which can be located near at hand and in a convenient place for both filling and draw-

ing off the water. The furnace as shown is made to use natural or manufactured gas, but the water heating coil can be supplied to any gasoline furnace in the same way.

#### A Home-Made Mill Scoop

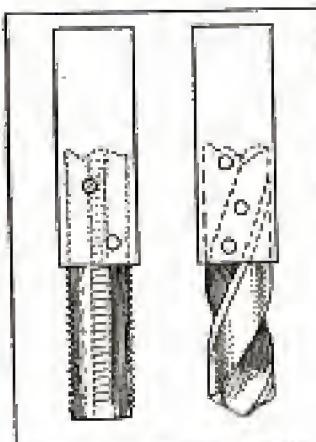
The accompanying sketch shows the construction of a scoop that is handy in almost any mill. Secure two boards 8 or 10 in. wide and cut them as shown for the sides. The bottom is covered with a piece of sheet iron or galvanized iron.



The latter will give much better service, says the American Miller. A round piece is fitted into the top edges of the boards and fastened with screws for the top handle. The back handle is attached with a bolt inserted through the handle and through a 2-in. piece of wood that is fitted into and nailed to the back end of the boards.

#### How to Use Broken Taps and Drills

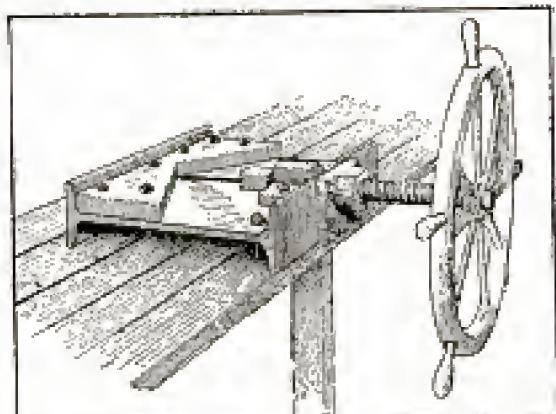
The short end of a tap or drill that has been broken can be used again with a device as shown in the sketch. It consists of a piece of brass or iron tubing which has several holes drilled in the sides at one end where the broken tap or drill is to be inserted. A sheet of paper should be wrapped around the tubing covering the holes, and the end of the tube beyond the broken tool filled with a wood plug. Melted babbitt is then poured into the tube around the broken



tool. The holes that are drilled into the tube will anchor the babbitt and keep it from turning. The broken tool should fit the hole of the tube very close.—Contributed by the Rockford Drilling Machine Co.

#### Concrete Reinforcement Steel Bending Vise

The main body of the vise is made from a piece of I-beam, 18 in. wide by 3 ft. long. A slot 1 in. wide is cut in the center and fitted with a block as shown in the sketch. A V-shaped casting is bolted in the I-beam on the opposite side from the block. A cast-iron wheel with handles is fastened to a



The Steel Bending Vise

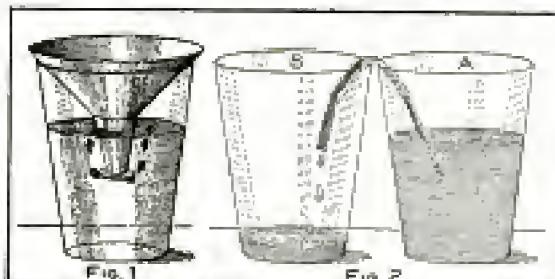
large screw which turns in a nut that is attached to the I-beam. The reinforcement steel is placed in the vise between the block and the V-shape casting and by turning the wheel with the handles the steel is bent to the proper shape.

#### White Lead to Dry Dead Flat

To make white lead paint dry to a perfectly dead flat on walls add a very little clear water to the paint and mix well with it. Beat up the lead as it comes from the keg, stir in the water until it combines with the lead, add color and driers, then thin with turpentine, says Master Painter. The water does no harm to the paint.

## How to Save Oil

One of several experiments as shown in Fig. 1 demonstrates the fact that dirty oil cannot be cleaned by passing it through hot water. When oil is passed through water or exposed to a moist atmosphere it will absorb from 2 to 3 per cent. of moisture and the muddy and turbid appearance of the oil



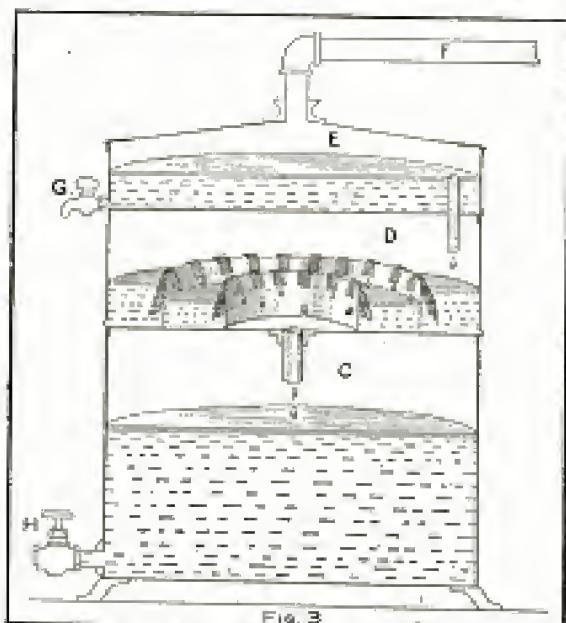
The Experiments

coming through the ordinary filter is caused by the moisture it contains. To try this experiment out, solder a small tin cap over the lower end of a funnel and make a small hole in the center of the cap. This will cause the oil to be spread out in drops as shown. A tumbler is filled half full of hot water and placed on a steam pipe or where it will remain hot. Place the funnel in the tumbler with the cap-covered end about 2 in. under water (Fig. 1) and then turn the dirty oil in very slowly. As each drop of oil forms on the edge of the cap, to flow through the water, watch them and see if they will leave any dirt behind. After enough dirty oil is put through to fill the glass, the water will be as clear as before. Put some iron filings in the oil and make another trial. The globules of oil will carry the filings up with them.

The second experiment may be tried out by placing two tumblers close together (Fig. 2) and placing a quantity of dirty oil in the glass A. Make a small tin trough to reach from the inside of one glass to the inside of the other and lay a lamp-wick in the trough, allowing one end to extend into the oil in glass A and the other end to hang in glass B. In a few hours' time the glass B will contain all the clean

oil, leaving the dirt and sediment in glass A.

These experiments will teach how to make a filter on a larger scale which can be made as illustrated in Fig. 3. For a clean oil receptacle make a tank from galvanized metal, C, 20 in. high and 30 in. in diameter. Make another tank of the same diameter and 12 in. high, with a lower rim flanged to set on top of the clean-oil tank, for a filtering chamber, D. On top of this is placed another tank, E, the same diameter and 6 in. high, with a flanged rim to set on the filtering chamber. This tank has a cover through which a pipe, F, conveys the dirty oil. This latter tank is the settling chamber where the oil separates from most of the water and heavy sediment. A pipe is fitted in the bottom of the settling chamber and extends nearly to the top of the tank. The oil overflows through this pipe into the filtering chamber, where it is then filtered through 9 ft. of 1-in. wick. By this means the oil is separated from the rest of its impurities and is carried up over the partitions of the troughs, draining into the clean oil tank, C. A spigot, G, is

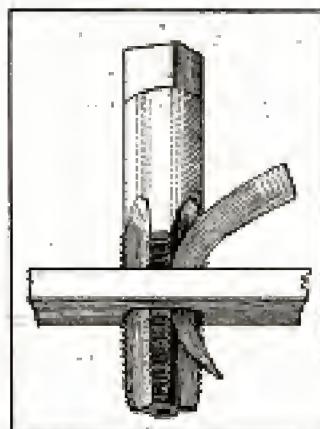


The Completed Oil Separator

placed in the settling chamber to drain off the sediment and a valve, H, is fitted in the bottom edge of the tank C to draw off the clean oil. This filter

will take care of about 1 gal. of oil an hour. After being filtered continuously for from six to eight months, the oil comes out perfectly clear, only slightly darker in color. Cheap paraffin oil, or an oil of high viscosity, cannot be used, as the wicks soon separate the filler or heavy compounding from the mineral stock, leaving a thin oil of poor lubricating qualities.—Condensed article from Power.

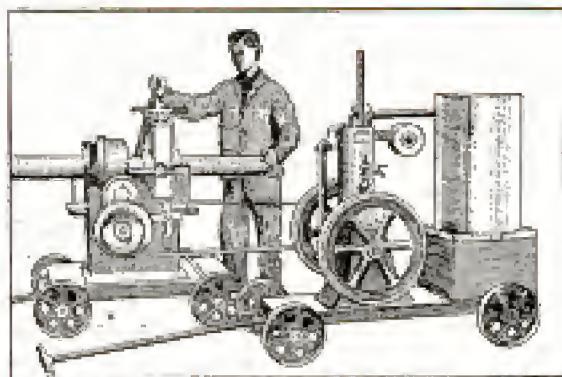
#### Making a Tap Cut Larger Than Its Size



makes a larger threaded hole. This will work in the same manner on reamers.

#### A Portable Pipe-Threading Machine Outfit

The illustration shows a pipe cutting and threading machine outfit for the use of a plumber or steamfitter. This outfit was arranged by a correspondent of Domestic Engineering and he finds it an economical way of cutting and

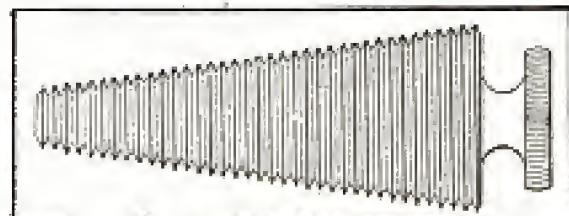


Portable Power-Driven Threading Machine

sitting large pipe on construction work. The cut is self-explanatory. This may be a suggestion of how power can be applied in many similar instances.

#### Caliper Taper Tapped Holes

The tool shown in the sketch is used for caliper taper tapped holes in boilers when fitting studs. It is a

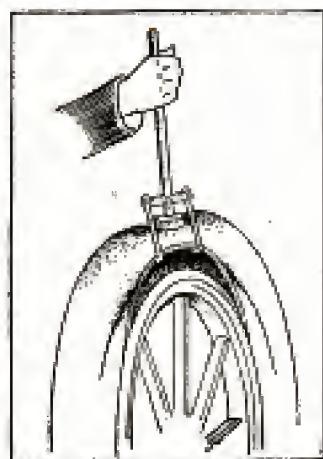


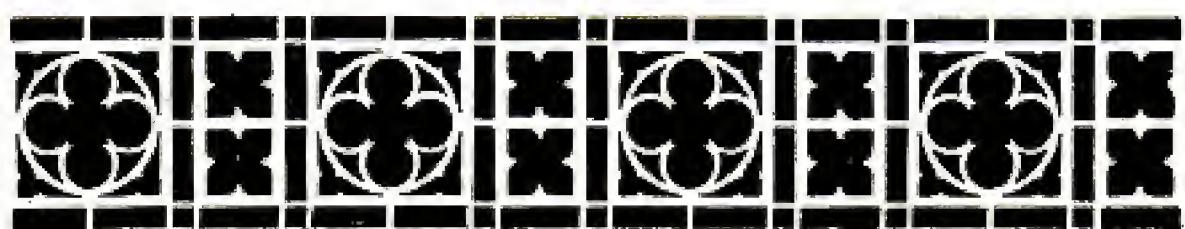
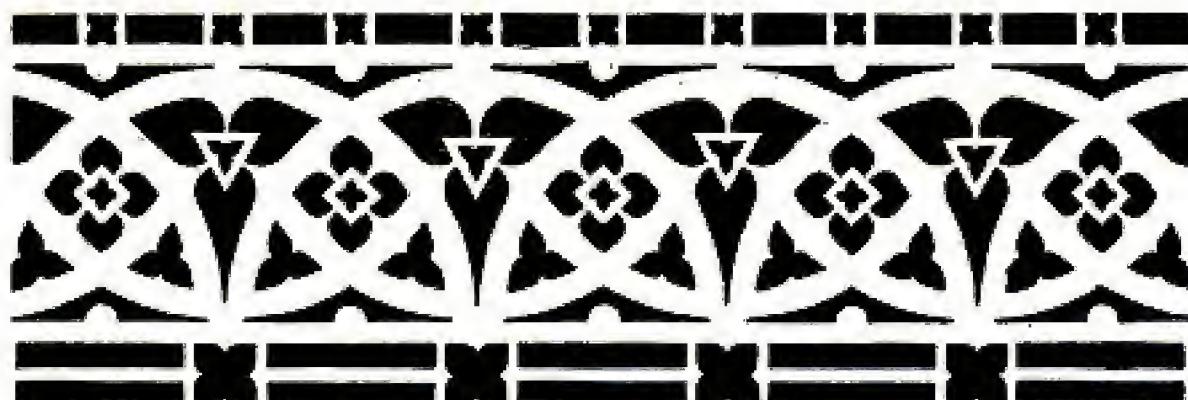
Taper Thread Caliper

simple, though very useful and economical tool, and it will doubtless be appreciated by those having much work of this kind to do, says Machinery. The thread part of the tool is about 3 in. long, with the small end  $\frac{1}{4}$  in. and the large end 1 in. in diameter. The hole in which the stud is to be fitted is caliperated by filling the threads of the plug with chalk. When the plug is removed the chalk will show exactly the largest diameter of the hole.

#### Tool for Putting on Automobile Tires

A simple tool that will aid one man in putting on the largest clincher automobile tire alone is shown in the illustration. The handle of the tool is made from a  $\frac{3}{4}$ -in. pipe 30 in. long with a cap fitted on both ends. A  $\frac{1}{2}$ -in. hole is drilled through the pipe  $4\frac{1}{2}$  in. from one end. A rod  $\frac{1}{2}$  in. in diameter and 6 in. long is threaded on both ends and placed in the  $\frac{1}{2}$ -in. hole drilled in the pipe. Hooks made from  $\frac{3}{8}$ -in.





**FRIEZE AND DADO BAND**—These designs are eminently suitable for a small church or chapel. The color scheme may be: Upper walls, deep vellum; dado, light bronze green; dado band stencilled in soft green and golden red on the vellum ground, with lines over and under of cool brown. The frieze could also be stencilled in similar colors on a like ground. With a ceiling in creamy white, and the woodwork stained or brush-stained light brown, a pleasing effect would be obtained.—From *The Decorators' and Painters' Magazine*.

rod iron and 6 in. long are flattened at their upper ends through which  $\frac{1}{2}$ -in. holes are drilled. Two collars are cut from  $\frac{1}{2}$ -in. pipe  $1\frac{1}{2}$  in. long and placed on the  $\frac{1}{2}$ -in. rod, one on each side of the pipe that forms the handle. The hooks are placed on the rod against the collars and held in place with nuts. A wood block,  $1\frac{1}{2}$  by 2 in. is fastened on the cap of the handle between the hooks with a  $\frac{1}{2}$ -in. bolt. The cap is drilled to receive the bolt. The wood block is rounded and a piece of rubber attached to keep it from slipping on the tire. When in operation the hooks are caught in the bead of the tire and the wooden block placed against it, and by pulling on the handle of the tool the tire will open up and give ample room to remove or place in lugs or give attention to the inner tube.—Contributed by S. J. Hixon, Chicopee Falls, Mass.

An excellent soft solder, good for purposes where not much pressure is carried, says Machinery, is made by adding to each pound of lead, while melting, a teaspoonful of common salt.

#### An Insulated Stool for Electricians

The accompanying illustration shows how to make an insulated stool on



which to stand while making line repairs or supplying carbons to arc lamps. A square piece of board is provided with legs made from wooden insulator brackets or pins. Each leg is then fitted with a heavy glass insulator. This will guard against any short circuit that the workman may make and will stop any connection with damp floors.

#### How to Dig Pole Holes in Quicksand

Pole holes may be dug in quicksand by using a barrel with both heads removed. The barrel is set where the hole is to be made and the excavation done from inside the barrel, allowing it to sink as the hole is dug, says the

Electric Traction Weekly. The sides of the hole are thus sheathed, and by means of a hand pump the water can be kept out.

If the quicksand occurs for a depth greater than the height of one barrel, a second barrel can be placed on top of the first. This second barrel should be a little larger than the first, so it will go down over the lower one part way. The pole must be raised in such a hole as soon as the hole is dug.

### Home-Made Saw Clamp

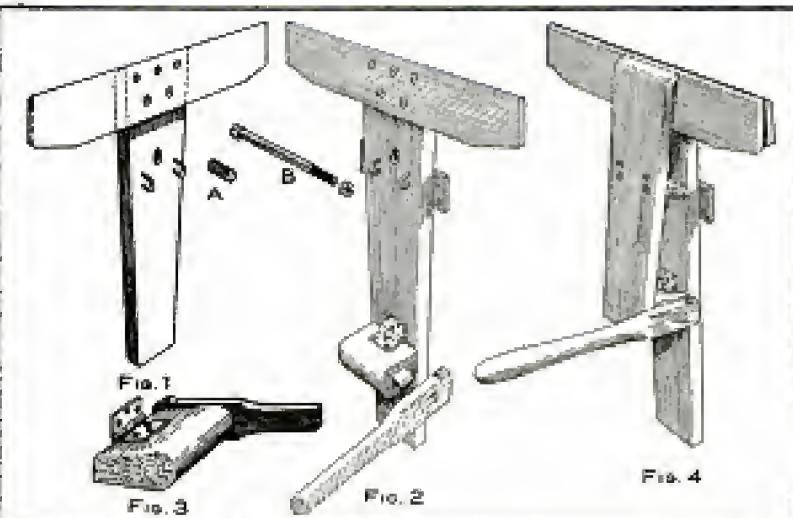
By N. J. McLEAN

The following is a description of how to make a clamp for holding a saw while filing: The uprights are made from  $1\frac{1}{2}$ -in. hard wood. The front piece, Fig. 1, is 19 in. long and dressed tapering so that one end will be 6 in. and the other 5 in. wide. The back piece, Fig. 2, is dressed in the same way but is 5 in. longer, making it 24 in. over all. For the parts that hold the saw use two pieces of iron plate,  $\frac{3}{8}$  by  $2\frac{1}{2}$  or 3 in. and 15 in. long. Bevel the lower corners as shown. Drill from three to five holes in the middle of these plates and countersink them to take common screw heads. These plates are screwed to the top ends of the uprights, allowing about  $\frac{3}{8}$  in. to project above. If iron plates are not available, use hardwood pieces  $\frac{3}{4}$  in.

thick by  $3\frac{1}{2}$  in. wide. Bore holes and fit two U-bolts about 8 in. from the upper ends of each of the uprights, as shown in Figs. 1 and 2. The loop should be large enough to take a  $\frac{1}{2}$ -in. bolt, B. The inner circle of the loop should be about  $\frac{3}{4}$  in. from the piece through which it passes for metal jaws and  $1\frac{1}{2}$  in. for wood. About 2 in. above the U-bolts bore a hole  $\frac{3}{8}$  in. deep in each upright to hold a light coil spring, A. This spring will keep the

jaws apart when the pressure is released.

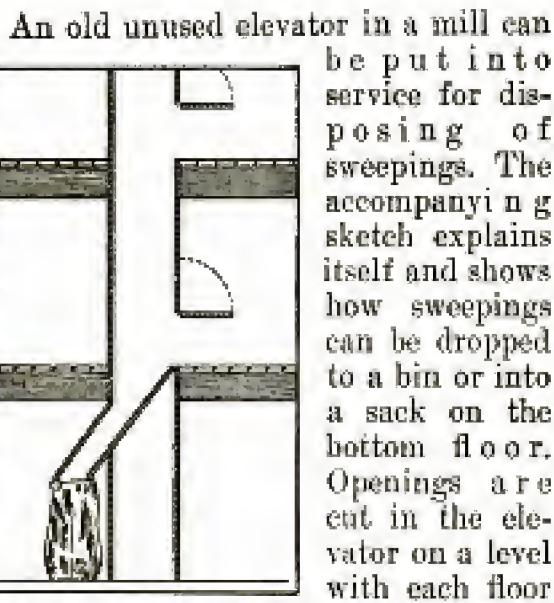
The adjusting piece is made of hard-wood, preferably maple or beech, about 9 in. long over all. One edge is trimmed circular on a  $1\frac{1}{2}$ -in. radius and the sides are tapered down, making the other edge  $\frac{1}{2}$  in. thick, as shown in Fig. 3. The extreme width from the rounding edge to the flat part is 3 in. Form a tenon on one end, as shown,  $\frac{3}{8}$  in. thick,  $2\frac{1}{2}$  in. wide and 2 in. long. Attach this adjusting piece to the longest upright with a 4-in. hinge, as shown in Fig. 2, and place it so the bottom surface will be even with the lower end of the shorter upright when the lever is in a horizontal position. The lever should be about 12 in. long,  $1\frac{1}{2}$  in. thick and 2 in. wide at the large end and tapered to form a handle on the other end. A mortise is cut to fit the tenon of the adjusting piece and a small bolt or rivet placed through the end of the lever to prevent its splitting. Fasten a thin plate of metal to the



back of the longest upright, as shown in Fig. 2. Drill two holes in each end large enough to insert a nail or screw; also, bore a small hole through the lower end of the upright, as shown in Fig. 4, for the purpose of fastening the clamp to a bench or elsewhere.

It is well to remember that a slight blow will break out the arms or rim of an iron pulley if trying to move one when stuck on a shaft.

### How to Handle Sweepings in a Mill



An old unused elevator in a mill can be put into service for disposing of sweepings. The accompanying sketch explains itself and shows how sweepings can be dropped to a bin or into a sack on the bottom floor. Openings are cut in the elevator on a level with each floor and doors provided to cover them. The miller will find this device a saving of time and labor.

### How to Hair a Violin Bow

Remove the slide, wedges, etc., from the frog. Take the hair and wind a piece of silk thread around it and singe the ends to prevent pulling out. Put a little mucilage on the end and push it well down in and then place the block and wedge. Shred the hair well out and over the block, making sure that the block is a little tight, then replace and put the ferrule on the end. Make a wedge the width of the ferrule and put it on tight, spreading the hair at the same time. Cut the wedge off close to the ferrule. This will finish the bottom end of the bow.

After removing the bone top of the upper end of the bow, put the frog in place and cut the hair at about  $\frac{1}{4}$  in. beyond the edge of the mortise while keeping the hair straight, says a correspondent in the Keystone. Wind a little piece of silk thread around it and singe the ends as before, put the bone slide on the hair and take the frog out of its place, tip it right over and apply a little mucilage. Put it into place and push the block home, bring the hair down over it and re-

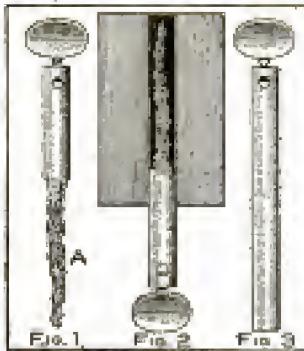
place the top or bone slide. This will complete the job, which will take about 15 minutes.

### Applying Leather Fillets to Patterns

Do not use glue for attaching leather fillets to patterns as the moisture from the wet sand will penetrate the thin edges of the leather and make them curl away from the pattern. The best adhesive to use for leather fillets is the regular orange shellac used in varnishing patterns, excepting that the shellac used should be quite thick, says Machinery. A sufficient amount of fillet for the work in hand is given a coat of shellac on the inside, and the same is done with the corners of the patterns which are to receive the fillets. Repeat this operation about three times, allowing two or three minutes between the coats, so that the varnish may soak in. After applying the last coat, place the leather fillet in position and rub it in place with a round stick of suitable size to correspond with the radius of the fillet. Proceeding in this way, the result will be far more satisfactory than when using glue, and the fillet will be practically waterproof.

### How to Repair Old Battery Zines

When battery zines become eaten away with the acid they can be made as good as new by first scraping clean the part A, Fig. 1, then inserting in a hole bored in a block of wood (Fig. 2). Melted zinc is then poured into the hole around the corroded part. When the metal becomes cold the wood is removed by splitting and you have a new zinc, as shown in Fig. 3.—Contributed by Luther Leggett, Chicago.



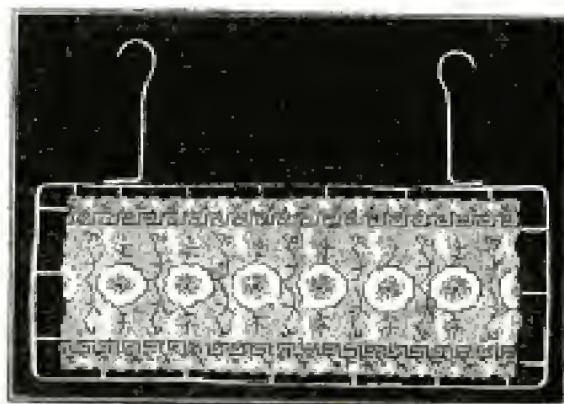
## A Method of Electroplating Lace

As copper-bronze powder can be electroplated the same as other metallic objects, it renders a conductor which may be applied to lace for this purpose. The task of plating lace is not so difficult as it would naturally seem. The first operation in the electroplating of lace is to render it waterproof. Shellac varnish is used for this purpose, as it dries rapidly and is easily made. The shellac should be of good quality and dissolved in alcohol, so as to make a thin varnish. The varnish thus made should be free from sticks and dirt. It should be made thin enough with the alcohol so that it will not clog up the meshes of the lace. Lay the lace upon a flat board, and with a stiff brush coat it with the shellac varnish and rub well into the fibres. The lace is then turned over and the other side coated before it becomes dry. As the varnish is thin the lace will not adhere to the board. Hang up the lace from one end so it will dry, which takes an hour or so. A second coat of shellac is now applied over the first and the whole allowed to dry. A third coat is usually necessary, and when this has dried the lace will be quite stiff and waterproof.

A frame is now made in which to hold the lace while plating. A rod of stiff brass or copper is bent in the form shown in the illustration, and hooks soldered on it for holding the edge of the lace. These hooks are made by soldering brass pins along the inside of the frame. The pins should be annealed before soldering by heating them to a red heat. Unless this is done, they are apt to break in service. When the pins are soldered on the points are bent in the form of a hook. The lace is then fastened inside of the frame on these hooks.

It is necessary to apply a coating of varnish to the lace on which to stick the copper-bronze powder. Any common varnish will answer, but it must be thinned with turpentine before application, in order to avoid filling up the meshes of the lace. Equal parts of

varnish and turpentine will make about the right mixture. The varnish, thus thinned, is applied to the lace with a rather stiff paint brush. Care must be taken to see that all parts are covered, and any meshes that may have become filled with the varnish cleaned out by means of a splinter of wood. The frame is now hung up and left for the varnish on the lace to become "tacky" but not dry. This will take from half an hour to an hour. When the varnish becomes "tacky" or quite sticky, the copper-bronze powder (pure copper powder) is applied to the lace by means of a badger-hair brush. The powder should be well rubbed into the lace



Holder for Lace While Plating

with the brush. Do not be too sparing of the powder, but apply plenty of it. By placing a sheet of paper underneath, the surplus powder may be saved. Allow the whole to dry for some time, or until the varnish hardens. This will take from 4 to 10 hours, which depends upon the kind of varnish used. It is necessary that the varnish should be thoroughly dry in order to prevent the powder from washing off in the solution.

When the varnish has dried, the lace is given a "strike" in a silver solution. The lace and frame is simply immersed in the silver solution for a second. The copper immediately changes to silver. The film of grease on the powder is also removed and the surface made a better conductor. The lace should not

be allowed to remain in the solution any longer than is necessary, or the copper may become attacked and dissolved. As soon as whitened, remove and rinse in cold water. When thoroughly rinsed, the lace and frame are hung in a copper solution in the same manner as any article to be plated. The first deposit is carried out in an acid copper solution which stands about 18 deg. Beaumé. This enables a heavy deposit to be put on with rapidity. Anodes should hang on each side of the lace in order to insure an even deposit. The lace will be gradually covered over its entire surface with an even, bright deposit of copper. From one to two hours are usually needed for a complete covering, and if a heavier deposit is necessary a longer time must be given. If a smooth, tough deposit is to be obtained, the current must not be high; about 1 to  $1\frac{1}{2}$  volts. After the lace has been copper plated, it may be silvered, gilded or treated with any other finish. The various colors produced on solid metal may be obtained on the lace as long as the solutions do not have to be used hot. Hot solutions are liable to disturb the metal on the surface of the lace unless it is very thick.

The lace so plated may be made into a variety of articles, as it has a tenacity of solid metal.—Condensed article from *The Brass World*.

#### An Improved Block for Holding Lathe Tools

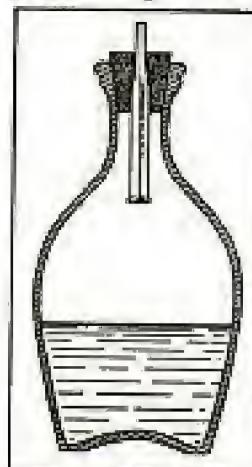
The accompanying illustration shows the construction of a V-block for use in holding round and flat lathe tools. After the tool is put in the V of the block, both are placed in the tool post of the lathe and clamped with the screw. The screw of the V-block is tightened on the



tool, which makes it rigid and eliminates the chattering.

#### Home-Made Dropper Cork for a Bottle

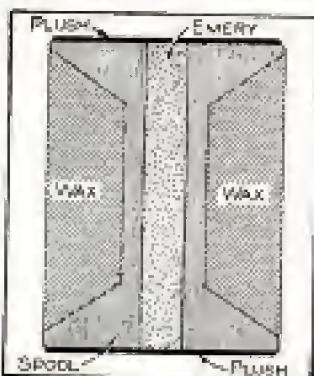
Almost every shop has some bottles containing different liquids and as only a few drops of some liquids are required



at a time, a dropper bottle becomes necessary. A dropper cork can be supplied to any bottle by boring a hole through a good new cork and inserting the glass of a fountain pen filler, allowing the small end to protrude about  $\frac{1}{2}$  in. from the top of the cork. The lower end will then extend down into the neck of the bottle about 2 in. below the bottom of the cork. The bottle is used in the same way as a pepper sauce bottle, says the Keystone. The glass tube has sufficient length so that when the drop reaches the bottom of the tube the air pressure has become great enough, combined with the capillary attraction of the tube, to sustain the drop in the tube, thereby preventing any escaping of the fumes.

#### A Tailor's Wax Spool

This handy device is made from an ordinary wood spool from which the thread has been removed. Melted wax is run on the spool between the flanges, filling the space level with the rims, as shown in the cut. A small circle of plush is glued fast to one end and the whole of the



spool is filled with fine emery and then another plush circle is glued on the other end. This will combine two useful implements—a thread waxer and a needle polisher—in a compact form.

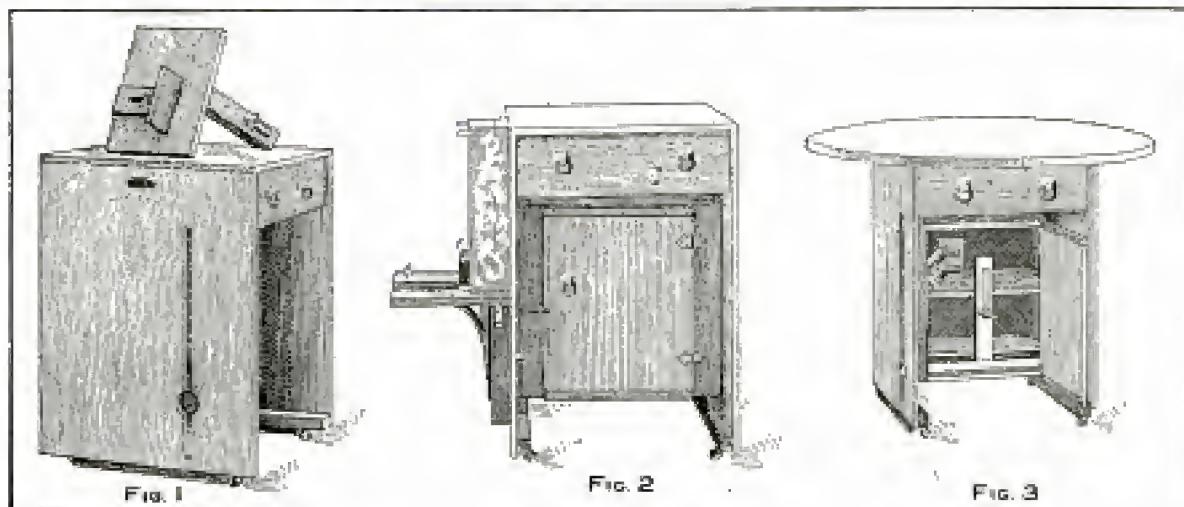
### How to Make a Pyrographer's Table

Any pyrographer will appreciate the construction of the table and cabinet as illustrated. Anyone doing burnt wood work will know the annoyance of building up a steady support for the arm to the level of the article on which the work is to be done. The size of this table may be made to suit the surroundings and the space of the builder. Fig. 1 shows the table with a slot cut in the side support in which to place

store. When the table is not in use for pyrography it can be used for a writing table or a round top provided and attached on which to play games. When used for this purpose the bracket, as well as the pyrographic outfit, is stowed away in the cabinet as shown in Fig. 3.—Contributed by I. Almstaedt, Thompsonville, Staten Island.

### How to Remove Stains from Concrete Floor

Oil stains on concrete floors may be removed by using a mixture of 1 lb. oxalic acid in 3 gal. water, with enough wheat flour added to make a paste that can be applied with a brush. Allow the application to remain for two days



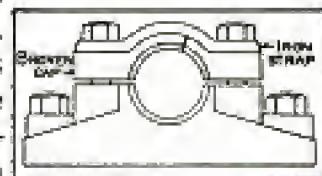
Pyrographer's Work Table

the thumb screw of the bracket as shown on top of the table. It will be noticed, Fig. 2, that while both drawer and cabinet are available for storing the apparatus, they are not in the way of the operator while sitting at his work; the drawer overhangs the knees and the cabinet is far enough back not to interfere with sitting up close to the work. The bracket shelf slides in the slot at the side of the table, and is fastened to any height by the thumb screw. There is also a smaller slide bracket on the shelf to clamp irregular objects to the side of the table. The thumb screws, hinges and drawer pulls can be purchased from any hardware

and then remove with clear water and a scrubbing brush. A second application will remove the most stubborn case.

### Temporary Repair on a Broken Bearing Cap

A temporary, as well as an ingenious, repair was made on a cap covering a bearing on a large machine. As it was impossible to get a new cap, and as there was not time to make a permanent repair, a n iron

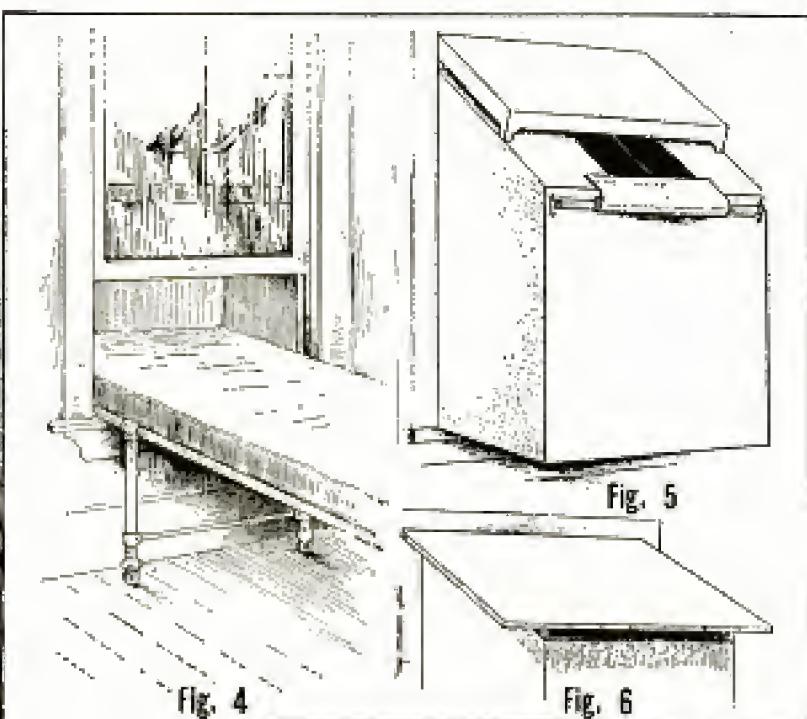
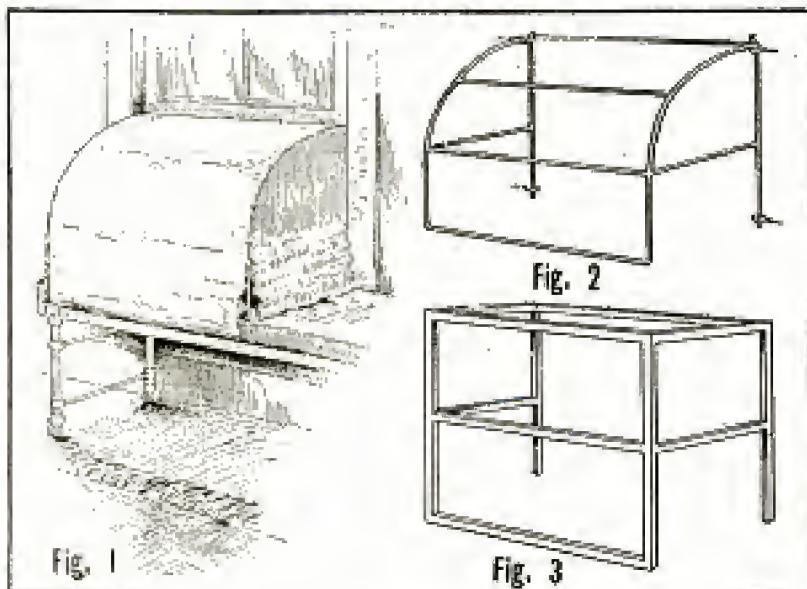


strap was made to fit the shape of the cap, and holes drilled in each end, says the National Engineer. This strap was put over the cap and held in place by the same bolts as held the cap in place before. This repair answered well until a new cap could be made.

How to Obtain Fresh Air While Sleeping

The accompanying illustrations show the construction of two different devices exhibited by the state of Massachusetts for the purpose of securing fresh air in sleeping rooms. Figure 1 shows a single bed placed before a window. A light iron frame, Fig. 2, fits over the head of the bed and within the window frame. This frame is covered with cotton cloth. After one is snugly tucked in bed under this shield, with the loose cloth at the end and side tucked in about him, he can raise the sash and be practically out of doors, though his body will be in a warm room, says the Country Gentleman. In cold weather the head should, of course, be protected by a warm cap, and if the window is on the "weather" side of the house it will be well to place an awning on the outside of the window as one does to keep out the sun's rays in the summer. This frame, as shown in Fig. 3, can be fastened to the inside of the window frame by screw-eyes and hooks. A square frame, Fig. 3, can be made from laths, which would answer much the same purpose, and be easier to cover, as the cloth could be tacked on.

Another device is shown in Fig. 4. Here the single bed has the head extended through the window into a little tent-like awning, the outside of which is shown in Fig. 5. The iron leg of the bed will have to be slipped back to the position shown in Fig. 4, or a wooden frame for the bed can be made by any one handy with tools. The bottom of the awning is entirely open, while the roof has the center opening that is shown in Fig. 5. The upper end of this opening is protected by a raised frame covered with cloth, while the lower part can be left open, to be covered in stormy or windy weather by a



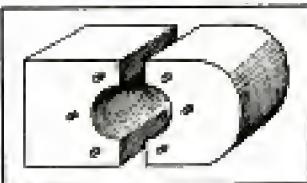
curtain on a regular spring roller, as shown. A cord runs from the curtain up over a little pulley at the top of the window frame and hangs down within reach of the occupant of the bed. A simpler cover, and one that would always protect from storm, is shown in Fig. 6. In this case a roof of cloth projecting some 6 in. at the sides and at the back is raised above the entirely open top, as shown. With such a plan it might be well to provide a cloth screen, or curtain, to close the open side, from which a strong wind may be blowing. The bottom of the sash, Fig. 4, can have a cloth tacked to it, to come down to the bed, if it is desired to keep the room within warm during the night.

♦ ♦ ♦

#### Side-Slap Stopped by Using Pegs in the Bearing

♦ ♦ ♦

Sometimes an annoying pound will be heard by the engineer while his engine is running. This was so in the case of a large Corliss engine and it seemed impossible for the engineer to locate the noise. After placing a crowbar between the shaft and the crosshead the trouble was found to be a side-slap caused by wear, says the Practical Engineer. The boxes were taken out, each drilled and three pegs made fast in the holes, as shown in the sketch. After they were dressed down to the proper length all lost motion was taken up and the trouble remedied.



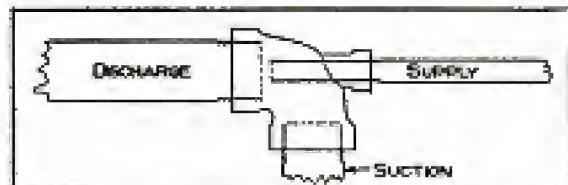
♦ ♦ ♦

#### Ejecting Water with Low Pressure

♦ ♦ ♦

For the purpose of removing water in cellars, pits and tanks the following described device will be of great assistance where water pressure can be supplied. It can also be used where poles are being placed in soft ground, as sand will go through as well as water. The device consists of a 2-in. suction and a 2-in. discharge pipe

placed in a reducing tee at right angles. The supply or pressure pipe is  $\frac{1}{2}$  in. and is screwed into the reducing tee, as shown, with the end extending a little beyond the suction pipe. The discharge



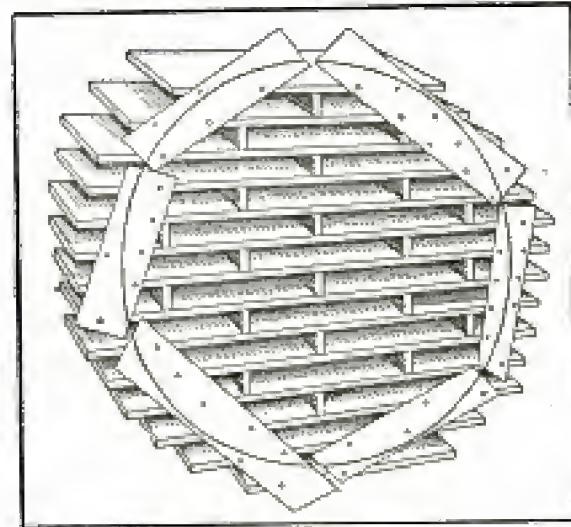
The Pipe Connections

pipe should not be over 10 times its diameter in length. With 50 lb. pressure from a hydrant, which is attached to the supply pipe, it will discharge about 80 gal. of water per minute.

♦ ♦ ♦

#### How to Make a Circular Louvre

A quick and good way to make a circular louvre is to first build the circle jam and then bevel the slats. Two or more pieces are provided for each slat from  $\frac{1}{8}$  by 2-in. material with the ends beveled to 45 deg., says a correspondent of the Wood-Worker. Tack these pieces edgewise on the face of one slat, then tack another slat on these, and so on until enough slats are added



Frame Ready to Saw

to fill the circle. Some thin boards are nailed to the surface of all the slats, as shown in the sketch, on which to draw a circle with a diameter the same as that of the jam. The whole mass of

slats thus bound together is placed on a band saw table and cut out on the line. It is then ready to drop into the jam and nail fast.

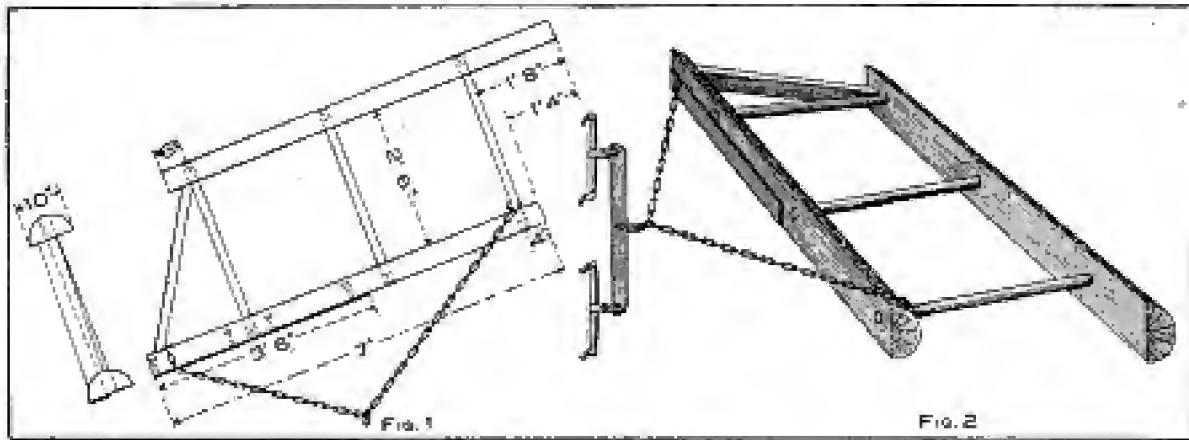
How to Make a Split-Log Drag for Earth Roads

By D. Ward King

In many sections of the country there is no rock, gravel or other hard materials for road building and the most common type of highway is the dirt road. A detailed description is here given for the construction of a split-log drag for making dirt roads. Various devices have been tried and the one to gain the most favor is the two-slab log or plank drag with a liberal "set back." A dry red cedar log

placed in position behind the other and from the end which is to be at the middle of the road measure 30 in. for the center of one cross stake, and 6 in. from the other end locate the center of the other stake. The center for the middle stake is found in the same manner as on the front slab. The holes that are bored for the stakes should be 2 in. in diameter and considerable care must be taken to hold the augur plumb while boring the holes so the stakes will fit properly. The hole to take the forward end of the chain should be bored in the same manner. When these holes are brought opposite each other, one end of the back slab will be 16 in. nearer the center of the roadway than the front one, giving what is known as the "set back."

The two slabs are held together with



King's Split-Log Drag

is the best material for a drag. Red elm and walnut when thoroughly dried are excellent, and box elder, soft maple, or even willow are preferable to oak, hickory or ash.

The log should be 7 or 8 ft. long and from 10 to 12 in. in diameter, and carefully split in the middle. The heaviest and best slab should be selected for the front. At a point on the front slab 4 in. from the end that is to be at the middle of the road locate the center of the hole for a cross stake, and 22 in. from the other end of the front slab locate the center for another cross stake. The hole for the middle stake will be on a line connecting and half-way between the other two, as shown in Fig. 1. The back slab should now be

stakes made of straight-grained timber and tapered gradually toward the ends. No shoulder is cut on them at the point where they enter the slabs. They should be 2 in. in diameter at the ends and long enough to hold the slabs 30 in. apart, and fastened in place with wedges only.

When the stakes have been placed in position and tightly wedged, a brace 2 in. thick and 4 in. wide is placed diagonally to them at the ditch end, as shown in Fig. 1. The brace is fitted on the front slab so that its lower edge will be 1 in. from the bottom edge of the front slab, while the other end rests in the middle of the back slab and in the angle between slab and the end stake.

The blade is made of a strip of iron  $3\frac{1}{2}$  ft. long, 3 or 4 in. wide and  $\frac{1}{4}$  in. thick. This iron is attached to the front slab, so that it will be  $\frac{1}{2}$  in. below the lower edge of the slab at the ditch end, while the end of the iron toward the middle of the road should be flush with the edge of the slab. The iron is fastened to the slab with  $\frac{3}{8}$ -in. flat-headed bolts and the holes to receive them should be countersunk. If the face of the slab is plumb it is well to wedge out the lower edge of the iron blade with a three-cornered strip of wood to give it a slant like the bit of a plane. The drag is shown complete in Fig. 2.

Drags can be constructed of planks instead of logs, and while the dimen-

These cleats should extend about 1 in. beyond the width of the platform.

An ordinary trace chain is strong enough to draw the drag if the clevis is not fastened through a link. The chain is wrapped around the rear stake and passed over the front slab. The other end of the chain is passed through the hole bored for it in the end of the front slab and fastened with a pin slipped through a link.

For ordinary purposes the clevis should be fastened far enough toward the blade end of the front slab on the chain to force the unloaded drag to follow the team at an angle of 45 deg. This will cause the earth to move along the face of the drag smoothly and will give comparatively light draft to the

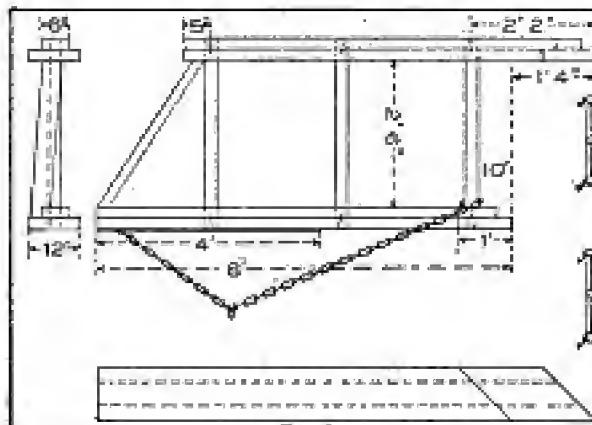


FIG. 3

King's Plank Drag

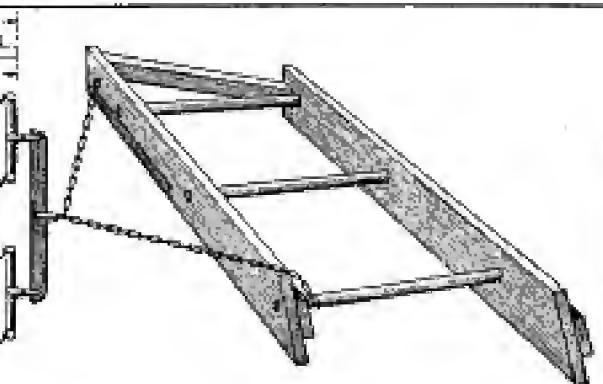


FIG. 4

sions and the construction are the same, the planks must be strengthened by placing a second plank, 2 by 6 in., along the middle and on the back side of each 2 by 12-in. plank, as shown in Fig. 3. The planks are held together with stakes, and an iron strip for a cutting edge is supplied in the same manner as for the split-log drag. This completed drag is shown in Fig. 4.

A platform made of 1-in. boards and held together with three cleats is placed on the stakes between the slabs. These boards should be spaced at least 1 in. apart to allow any earth that may heap up and fall over the front slab to sift through upon the road again. The end cleats should be placed so that they will just drop inside of the end stakes, while the middle cleat can be shifted to either side of the middle stake.

team, provided the driver rides in the line of draft. Sometimes conditions are met that require special treatment. Often a flat place several rods in length or a seepy spot needs special attention.

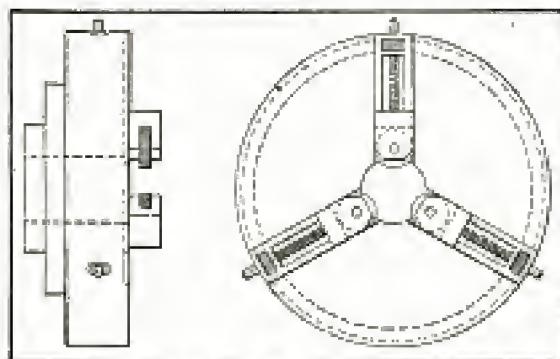
The distance from the drag at which the team is hitched affects the depth of cutting. Shortening the chain tends to lift the front slab from the ground; a longer hitch causes the blade to cut more deeply. If small weeds are to be cut or a furrow of earth is to be moved, the double-tree should be attached rather close to the ditch end of the drag. The drag will then move nearly ditch end foremost, and the driver should stand with one foot on the extreme forward end of the front slab. This will swing the drag back to the proper angle and will cause the blade to plow.

Usually two horses are enough to

pull a drag over an ordinary earth road. When four horses are used, they should be hitched to the drag by means of a four-horse evener. The team should be driven with one horse on each side of the right-hand wheel track or run the full length of the portion to be dragged, and the return made over the other half of the roadway.

### How to Knurl Work in Long Lengths

Recently we had a lot of wire of various sizes to knurl, says a correspondent of American Machinist. An



Knurls in the Chuck's Jaws

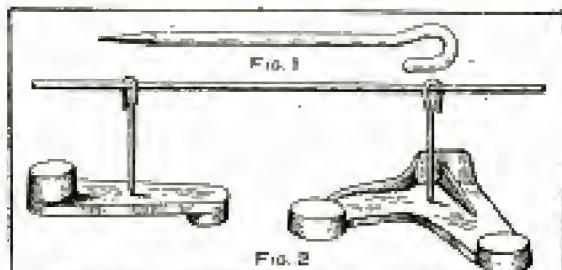
old three-jaw self-centering chuck was taken apart and the jaws annealed, after which they were slotted as shown, to receive the knurls. The wire was in coils and was mounted on a turntable at the rear of the spindle. After passing between the straightening rolls it was led through the spindle between the knurls and grasped by a clamp held in the tool holder. The jaws of the clamp were shod with copper so as not to mar the work. A set-screw held the circular rack after the knurls were adjusted to depth. The carriage as it receded from the chuck drew the wire through the straightening rolls and the knurls.

The knurls were about 1 in. diameter. They would knurl any size material that would pass through the spindle. The knurling was done with a liberal supply of oil flowing on the knurls.

A chain  $2\frac{1}{2}$  miles long and weighing 25 tons was recently made in England for use in a colliery.

### A Varnishing Hook to Hold Wood Patterns

When varnishing small wood patterns it is difficult to hold them when

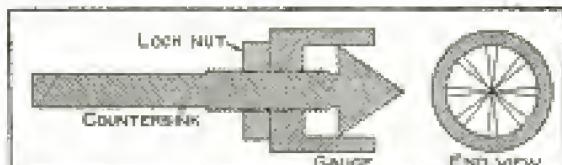


Patternmakers' Varnishing Hook

applying the finishing coat, and to hold them when drying without some of the parts touching, which destroys the finish. A wire hook made as shown in Fig. 1 about  $2\frac{1}{2}$  in. long and hung over a wire as in Fig. 2, will not only hold patterns when coating and drying, but also will protect the fingers from coming in contact with the varnish. The small hole made by inserting the point of the hook will not mar the pattern much, and if placed in the right position it can be used by the molder for lifting.

### An Adjustable Gauge for a Countersink

Countersinking holes to different depths for flat-headed screws in pieces varying in thickness makes it impossible to gauge the depth by the drill press spindle, or to do the work neatly with a hand drill. The sketch shows how to make a gauge on a countersink that



The Countersink Gauge

will gauge the work perfectly, whether used with a hand drill or in a drill press. The gauge is in the form of a cup that can be adjusted by turning it on threads of the countersink. A lock nut is fitted to hold the gauge when set at the proper depth.

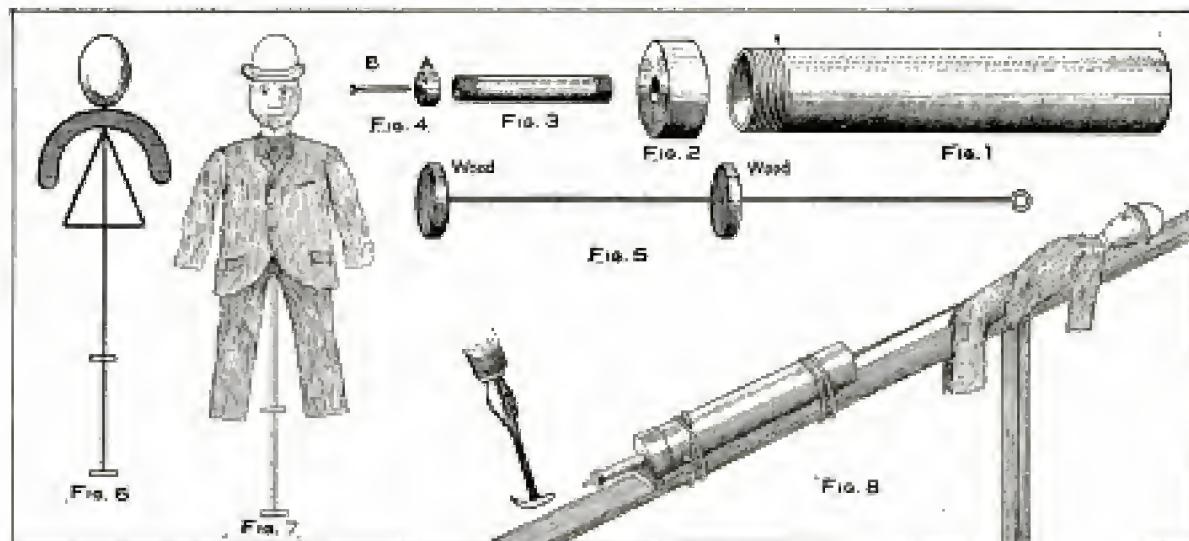


# Amateur Mechanics



## Fourth of July Catapult

Home-Made Cannon Which Will Hurl Life-Size Dummy 100 Feet Through the Air



Among the numerous exciting amusements in which boys may participate during the Fourth of July celebration is to make a cannon that will shoot life-sized dummies dressed in old clothes. The building of a cannon as described in the following makes one that is safe to fire and not dangerous to others, provided care is taken to place it on an angle of 45 deg. and not to fire when anyone is within its range. The powder charge is in the safest form possible, as it is fired with a blow from a hammer instead of lighting a fuse. If the cannon is made according to directions there cannot possibly be any explosion.

Secure a piece of common gas pipe, 4 to 6 in. in diameter, and the length may be from 18 to 24 in. Old pipe may be used if it is straight. Have a machinist cut threads on the outside of one end, as shown in Fig. 1, and fit an iron cap (Fig. 2) tightly on the threaded end of the pipe. The cap is drilled and tapped in the center for a 1-in. pipe. Thread both ends of a 1-in. pipe that is 4 in. long (Fig. 3) and turn one end securely into the threaded hole of the cap. This pipe should pro-

ject  $\frac{1}{2}$  in. inside of the cap. Fit a cap (Fig. 4) loosely on the other end of the 1-in. pipe. A hole is drilled into the center of this small cap just large enough to receive a 6-penny wire nail (B, Fig. 4).

This completes the making of the cannon and the next step is to construct a dummy which can be dressed in old clothes. Cut out two round blocks of wood from hard pine or oak that is about 3 in. thick, as shown in Fig. 5. The diameter of these blocks should be about  $\frac{1}{2}$  in. less than the hole in the cannon, so they will slide easily. In the center of each block bore a  $\frac{1}{4}$ -in. hole. Secure an iron rod about 4 ft. long and make a ring at one end and thread 4 in. of the other. Slip one of the circular blocks on the rod and move it up toward the ring about 14 in. Turn a nut on the threads, stopping it about  $3\frac{1}{2}$  in. from the end of the rod. Slip the other circular piece of wood on the rod and up against the nut and turn on another nut to hold the wooden block firmly in its place at the end of the rod. If the rod is flattened a little at the place where the upper block is located it will hold tight. These are

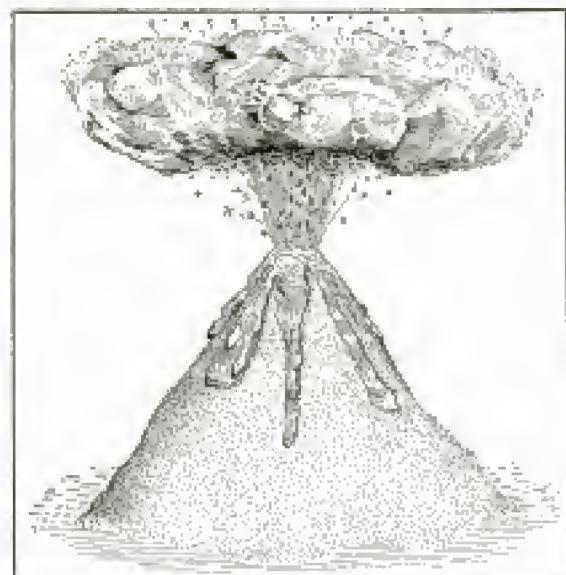
shown in Fig. 5. Take some iron wire about  $\frac{1}{8}$  in. in diameter and make a loop at the top of the rod for the head. Wire this loop to the ring made in the rod and make the head about this loop by using canvas or gunny cloth sewed up forming a bag into which is stuffed either excelsior, paper or hay. The arms are made by lashing with fine wire or strong hemp, a piece of wood 1 in. square and 20 in. long, or one cut in the shape shown in Fig. 6, to the rod. Place the wood arms close to the bottom of the head. Make a triangle of wire and fasten it and the cross arm securely to the top of the rod to keep them from slipping down. A false face, or one painted on white cloth, can be sewed on the stuffed bag. An old coat and trousers are put on the frame to complete the dummy. If the clothing is not too heavy and of white material so much the better. To greatly increase the spectacular flight through the air, a number of different colored streamers, 6 or 8 in. wide and several feet in length made from bunting, can be attached about the waist of the dummy. The complete dummy should not weigh more than 6 lb.

The cannon is mounted on a board with the cap end resting against a cleat which is securely nailed to the board and then bound tightly with a rope as shown in Fig. 8. Lay one end of the board on the ground and place the other on boxes or supports sufficiently high to incline it at an angle of about 45 deg. Enough of the board should project beyond the end of the cannon on which to lay the dummy. When completed as described, it is then ready to load and fire. Clear away everyone in front and on each side of the cannon, as the dummy will fly from 50 to 100 ft. and no one must be in range of its flight. This is important, as the rod of the frame holding the clothes will penetrate a board at short range. An ordinary shot gun cartridge of the paper shell type is used for the charge and it must be loaded with powder only. Coarse black powder is the best, but any size will do. When loading the rod with the wooden blocks, on

which the dummy is attached, do not place the end block against the breech end of the cannon, leave about 2 or 3 in. between the end of the cannon and the block. Insert the cartridge in the 1-in. pipe. The cartridge should fit the pipe snug, which it will do if the proper size is secured. Screw on the firing-cap, insert the wire nail firing-pin until it rests against the firing-cap of the cartridge. If the range is clear the firing may be done by giving the nail a sharp rap with a hammer. A loud report will follow with a cloud of smoke and the dummy will be seen flying through the air, the arms, legs and streamers fluttering, which presents a most realistic and life-like appearance. The firing may be repeated any number of times in the same manner.

#### How to Make a Miniature Volcano

A toy volcano that will send forth flames and ashes with lava streaming down its sides in real volcanic action can be made by any boy without any more danger than firing an ordinary fire-cracker. A mound of sand or earth is built up about 1 ft. high in the shape of a volcano. Roll up a piece of heavy paper, making a tube 5 in. long and  $1\frac{1}{2}$  in. in diameter. This tube of paper is placed in the top of the mound by first setting it upon a flat sheet of paper and building up the sand or



Volcano in Action

earth about the sides until it is all covered excepting the top opening. This is to keep all dampness away from the mixture to be placed within.

A fuse from a fire-cracker, or one made by winding some powder in tissue paper, is placed in the paper tube of the volcano with one end extending over the edge. Get some potash from a drug store and be sure to state the purpose for which it is wanted, as there are numerous kinds of potash that will not be suitable. An equal amount of sugar is mixed with the potash and placed in the paper tube. On top of this put a layer of pure potash and on this pour some gun powder. This completes the volcano and it only remains for the fuse to be lighted and action will begin with an explosion which sends fire, smoke and sparks upward. Flames will follow and the lava pours down the sides of the mound.

#### Wire Loop Connections for Battery Binding-Posts

The trouble with battery binding-post connections can be avoided by winding the bare end of the connecting wire around the binding-post screw and then back around its extending length as shown in the sketch. Always screw down permanent connections with pliers.



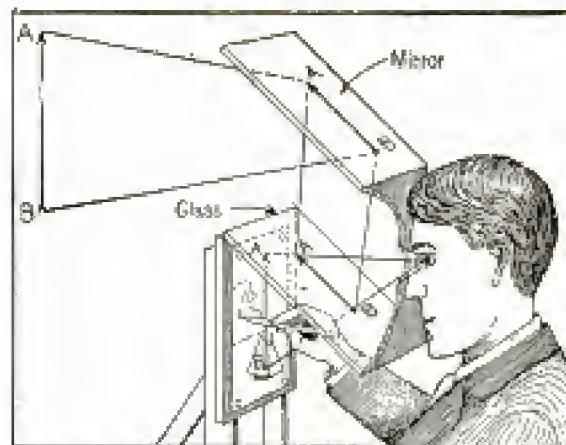
#### Melting Metal in the Flame of a Match

The flame of an ordinary match has a much higher temperature than is generally known and will melt cast-iron or steel filings. Try it by striking a match and sprinkle the filings through the flame. Sputtering sparks like gunpowder will be the result of the melting metal.

The squirrel slaughter of Russia amounts to 25,000,000 per year.

#### Landscape Drawing Made Easy

With this device anyone, no matter how little his artistic ability may be, can draw accurately and quickly any little bit of scenery or other subject and get everything in the true perspective and in the correct proportion.



Drawing with the Aid of Reflecting Glasses

No lens is required for making this camera—just a plain mirror set at an angle of 45 deg., with a piece of ordinary glass underneath, a screen with a peck hole and a board for holding the drawing paper. The different parts may be fastened together by means of a box frame, or may be hinged together to allow folding up when carrying and a good tripod of heavy design should be used for supporting it. In order to get the best results the screen should be blackened on the inside and the eye-piece should be blackened on the side next to the eye. A piece of black cardboard placed over the end of the eye-piece and perforated with a pin makes an excellent peck hole.

In operation the rays of light coming from any given object, such as the arrow AB, strike the inclined mirror and are reflected downward. On striking the inclined glass a portion of the light is again reflected and the rays entering the eye of the operator produce the virtual image on the paper as shown. The general outlines may be sketched in quickly, leaving the details to be worked up later. This arrangement may be used for interior work when the illumination is good.

## How to Make a Pilot Balloon

By E. Goddard Jorgensen

Unusual interest is being displayed in ballooning, and as it is fast becoming the favorite sport many persons would like to know how to construct a miniature balloon for making experiments. The following table will give the size, as well as the capacity and lifting power of pilot balloons:

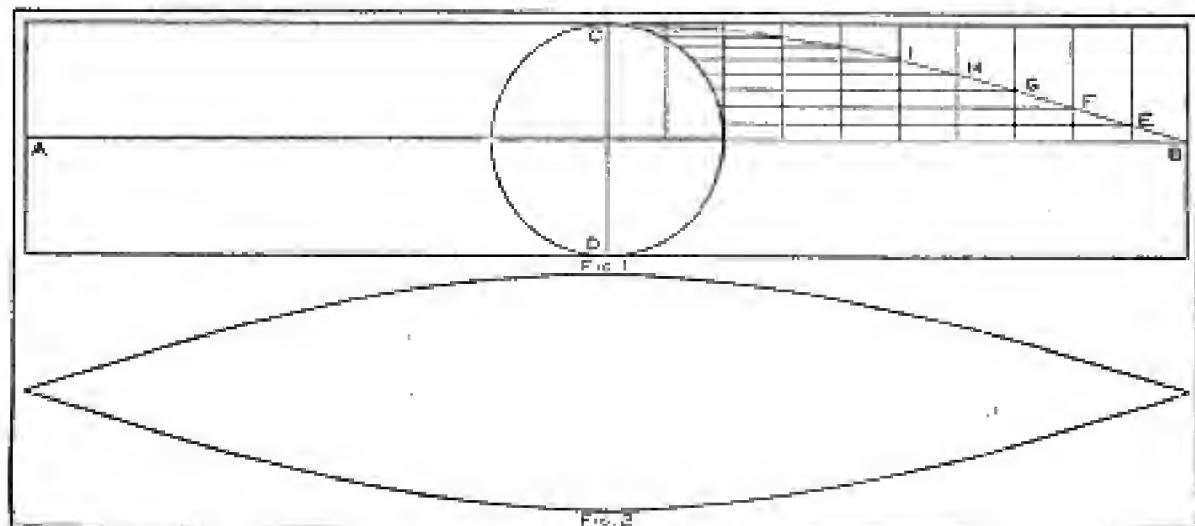
Diameter.	Cap. in Cu. Ft.	Lifting Power.
5 ft.	65	4 lb.
6 ft.	113	7 lb.
7 ft.	179	11 lb.
8 ft.	268	17 lb.
9 ft.	381	24 lb.
10 ft.	523	33 lb.
11 ft.	697	44 lb.
12 ft.	905	57 lb.

The material must be cut in suitable shaped gores or segments. In this article we shall confine ourselves to a 10-ft. balloon. If the balloon is 10 ft. in diameter, then the circumference will be approximately  $3\frac{1}{7}$  times the diameter, or 31 ft. 5 in. We now take one-half this length to make the length of the gore, which is 15 ft.  $7\frac{1}{2}$  in. Get a piece of paper 15 ft.  $7\frac{1}{2}$  in. long and 3 ft. wide from which to cut a pattern, Fig. 1. A line, AB, is drawn lengthwise and exactly in the middle of the paper, and a line, CD, is drawn at right angles to AB and in the middle of the paper lengthways. The intersecting point of AB and CD is used for a center to ascribe a circle whose diameter is the same as the width of the paper, or 3 ft. Divide one-quarter of the circle

into 10 equal parts and also divide one-half of the line AB in 10 equal parts. Perpendicular lines are drawn parallel with the line CD intersecting the division points made on the one-half line AB. Horizontal and parallel lines with AB are drawn intersecting the division points made on the one-quarter circle and intersecting the perpendicular line drawn parallel with CD. A line is now drawn from B to E and from E to F, and so on, until all the intersecting lines are touched and the point C is reached. This will form the proper curve to cut the pattern. The paper is now folded on the line AB and then on the line CD, keeping the marked part on the outside. The pattern is now cut, cutting all four quarters at the same time, on the curved line from B to C. When the paper is unfolded you will have a pattern as shown in Fig. 2. This pattern is used to mark the cloth, and after marked is cut the same shape and size.

The cloth segments are sewed together, using a fine needle and No. 70 thread, making a double seam as shown in Fig. 3. When all seams are completed you will have a bag the shape shown in Fig. 4. A small portion of one end or a seam must be left open for inflating. A small tube made from the cloth and sewed into one end will make a better place for inflating and to tie up tightly.

It is now necessary to varnish the bag in order to make it retain the gas.



Pattern for Cutting the Segments

Procure 1 gal. of the very best heavy body, boiled linseed oil and immerse the bag in it. The surplus oil is squeezed out by running the bag through an ordinary clothes wringer several times. The bag is now placed in the sun for a thorough drying. Put the remaining oil in a kettle with  $\frac{1}{2}$  lb. of beeswax and boil well together. This solution is afterward diluted with turpentine so it will work well. When the bag is dry apply this mixture by rubbing it on the bag with a piece of flannel. Repeat this operation four times,

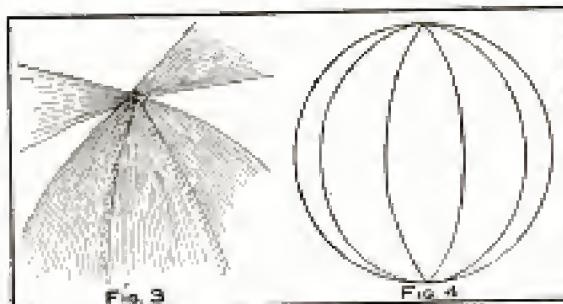


Fig. 3  
Fig. 4  
Sewing Segments Together

being sure of a thorough drying in the sun each time. For indoor coating and drying use a small amount of plumbic oxide. This will dry rapidly in the shade and will not make the oil hard.

Fill the bag with air by using a pair of bellows and leave it over night. This test will show if the bag is airtight. If it is not tight then the bag needs another rubbing. The next operation is to fill the bag with gas.

Hydrogen gas is made from iron and sulphuric acid. The amounts necessary for a 10-ft. balloon are 125 lb. of iron borings and 125 lb. of sulphuric acid. 1 lb. of iron, 1 lb. of sulphuric acid and 4 lb. of water will make 4 cu. ft. of gas in one hour. Secure two empty barrels of about 52 gal. capacity and connect them, as shown in Fig. 5, with  $\frac{3}{4}$ -in. pipe. In the barrel, A, place the iron borings and fill one-half full of clear water. Fill the other barrel, B, with water 2 in. above the level of the water in barrel A. This is to give a water pressure head against foaming when the generator is in action. About 15 lb. of lime should be well mixed with the water in the barrel B. All

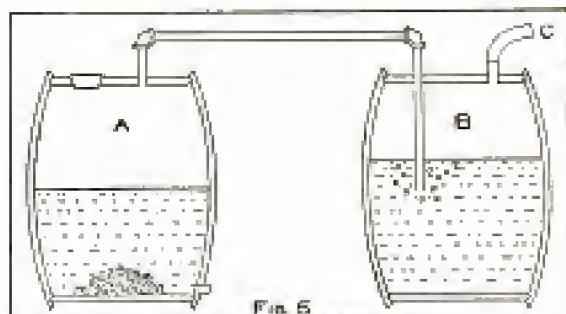


Fig. 5  
The Hydrogen Generator

joints must be sealed with plaster of Paris. Pour in one-half of the acid into the barrel, A, with the iron borings. The barrels are kept tight while the generation is going on with the exception of the outlet, C, to the bag. When the action is stopped in the generator barrel, A, let the solution run out and fill again as before with water and acid on the iron borings. The outlet, C, should be always connected with the bag while the generator is in action. The  $\frac{3}{4}$ -in. pipe extending down into the cooling tank, B, should not enter into the water over 8 in. When filled with gas the balloon is ready for a flight at the will of the operator.

#### How to Clean a Clock

It is very simple to clean a clock, which may sound rather absurd. For an amateur it is not always necessary to take the clock to pieces. With a little care and patience and using some benzine, a clean white rag, a sable brush and some oil a clock can be cleaned and put into first-class running order. The benzine should be clean and free from oil. You can test benzine by putting a little on the back of the hand; if it is good it will dry off, leaving the hand quite clean, but if any grease remains on the hand, it is not fit to use.

The oil should be of the very best that can be procured. Vegetable oils should never be used. Clock oil can be procured from your druggist or jeweler.

All loose dirt should be removed from the works by blowing with bellows, or a fan, or dusting with a dry

brush; in the latter case great care should be exercised not to injure any of the parts. Dip the brush in the benzine and clean the spindles and spindle holes, and the teeth of the escapement wheel. After washing a part, wipe the brush on the rag and rinse in the benzine; this should be repeated frequently, until no more dirt is seen.

When the clock has dried, oil the spindle holes carefully; this may be done with a toothpick or a sliver of wood cut to a fine point. Oil the tooth of the escapement wheel slightly, using a fine brush.

#### How to Make Blueprint Lantern Slides

Lantern slides of a blue tone that is a pleasing variety from the usual black may be made from spoiled or old plates which have not been developed, by fixing, washing well and then dipping five minutes in the following solution:

A. Green iron ammonium citrate	150 gr.
Water	1 oz.
B. Potassium ferrocyanide	50 gr.
Water	1 oz.

Prepare the solutions separately and mix equal parts for use, at the time of employment. Dry the plates in the dark, and keep in the dark until used. Printing is done in the sun, and a vigorous negative must be used, says the *Moving Picture World*. Exposure, 20 to 30 minutes. Wash 10 minutes in running water and dry. Brown or purple tones may be had by sensitizing with

the following solution instead of the above:

Distilled water	1 oz.
Silver nitrate	50 gr.
Tartaric or citric acid	3/4 oz.

Bathe the plates 5 minutes, keeping the fingers out of the solution, to avoid blackened skin. Dry in the dark. Print to bronzing under a strong negative; fix in hypo, toning first if desired.

#### A Substitute for a Ray Filter

Not many amateur photographers possess a ray filter. A good substitute is to use the orange glass from the ruby lamp. This can be held in position in front of the lens with a rubber band. A longer exposure will be necessary, but good cloud effects can be procured in this manner.

#### Electric Lamp Experiments

Incandescent electric lamps can be made to glow so that they may be seen in a dark room by rubbing the globe on clothing or with a paper, leather or tinfoil and immediately holding near a  $\frac{1}{2}$ -in. Ruhmkorff coil which is in action but not sparking. The miniature 16-ep., 20 and 22-volt lamps will show quite brilliantly, but the 110-volt globes will not glow. When experimenting with these globes everything should be dry. A cold, dry atmosphere will give best results.



Annual Regatta, Port Melbourne, Australia

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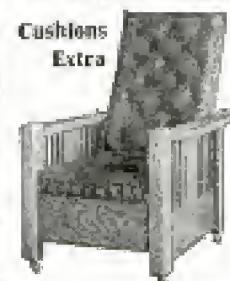
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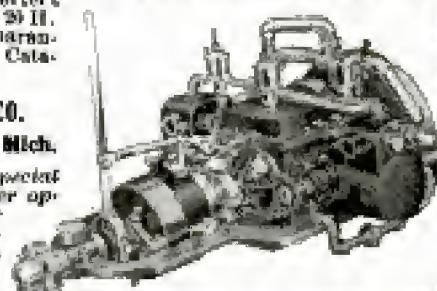
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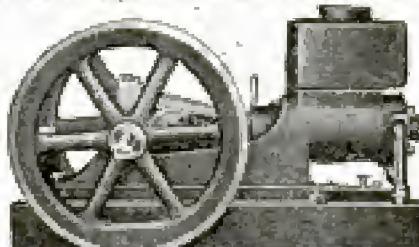
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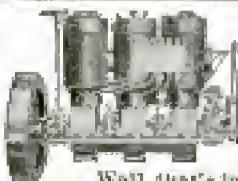
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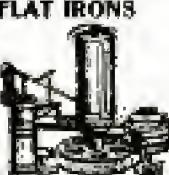


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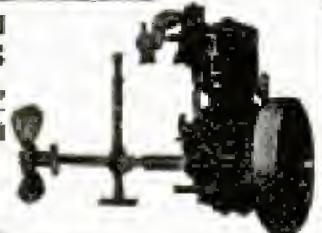
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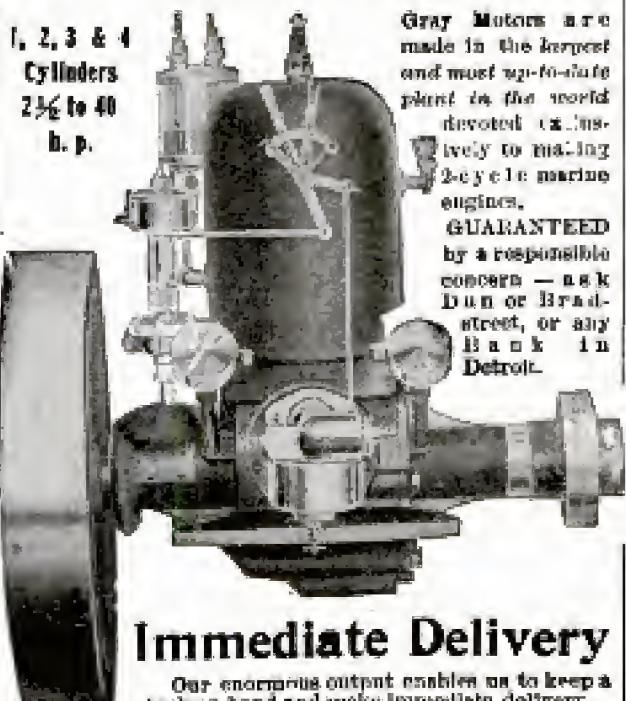
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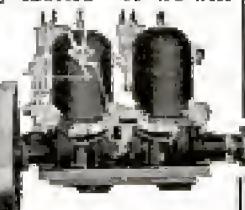
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Reliable-Reversible Two Cycle \$87.00 (Bare)

No. 5  
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5 to 8  
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Light, simple and easy to operate. Only three moving parts. Main bearings lubricated. Material and workmanship of the highest grade and guaranteed. Jump spark ignition.

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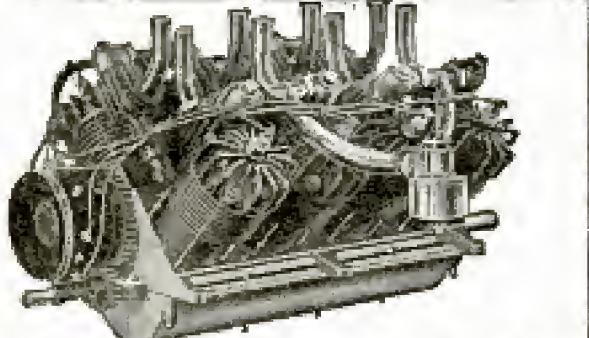
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1½ and 2½ H. P. equipped with short  
connections for  
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watering attachment for  
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Will work against  
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Gasoline in base  
of engine.

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Runs your washing  
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Power for small  
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**NET PRICE \$8.00**

No. 1492 4-inch motor  
for grinding, polishing  
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Motor and pulley only . . . . . \$3.50  
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Speeds 3000 to 6000 revolu-  
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Motor fit any faucet—  
guaranteed twice the power  
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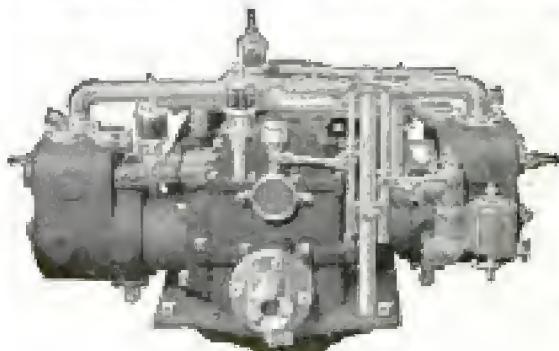
motor. Money back if you don't want the goods. Catalogue  
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Order through your local hardware or tool dealer, or  
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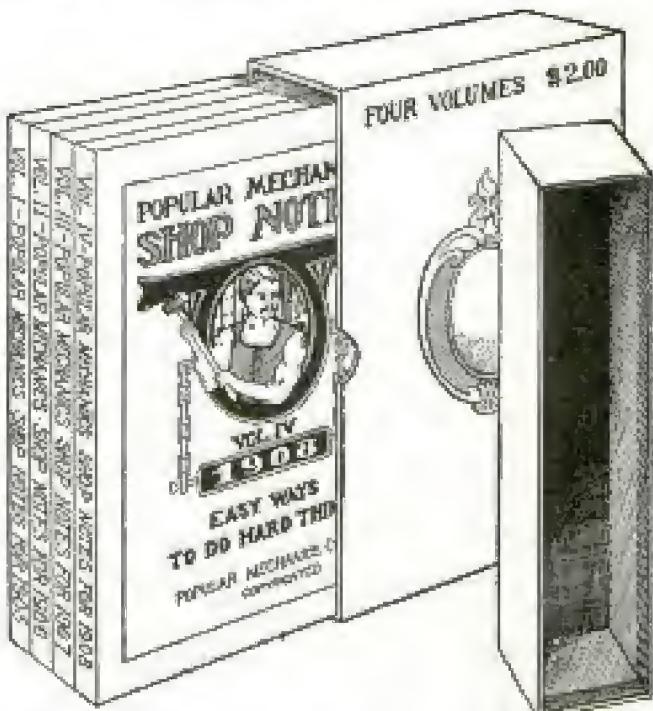
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**"Shop Notes for 1907"**  
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supply an abundance of water for your stock, garden and domestic use. The engine also runs your churn, separator, feed mill, wood saw. In fact does more chores than three men at one-third one man's pay. Operates on gas, gasoline, kerosene or distillate.

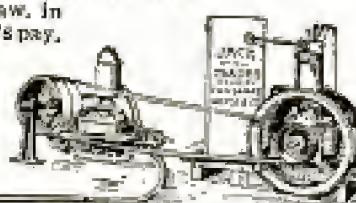
*Cut out complete advertisement and send for Pumping Catalog No. W.A. 49*

**Fairbanks, Morse & Co.**  
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## A Modern Water System

### Fairbanks-Morse Domestic Outfits

Give the most reliable and economical water supply for farm or suburban homes. No more fear of fire. No pump handle and water carrying drudgery if you own a Fairbanks-Morse outfit. Always ready to



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To Secure a  
Powerful, Speedy, Dependable  
2, 4 or 6 H.P.

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We have recently purchased the entire plant of the St. Clare Motor Co., and offer a limited number of

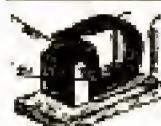
### The Famous Little Skipper Marine Engines

at very interesting prices. They are selling rapidly. The price will be increased when the present lot is

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Manufacturers of  
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Steam and Air Chimes Whistles, etc., etc.



### Electric Power Motor

Sample prepaid for  
Agents Wanted. **35** cents

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We furnish complete sets of Castings, 16 to 31 Pieces, for your Auto, Launch, Motor-Cycle, Engine or Work Shop.

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6 to 9 Actual Brake Horse Power—2 Cycle—3 Port Engine. \$100 complete with accessories. IT'S GUARANTEED! We sell Blue Print Working Drawings—2 or 4 Cycle. We have Motors complete with Spark Plug from \$30.00 to \$400. Complete Castings for building same from \$5.50 to \$108.00. Send stamp for Catalog. To-day!

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## PREMIER MARINE MOTOR

The first and only 2 cycle engine with mechanically controlled intake ports.

### 1908 Features

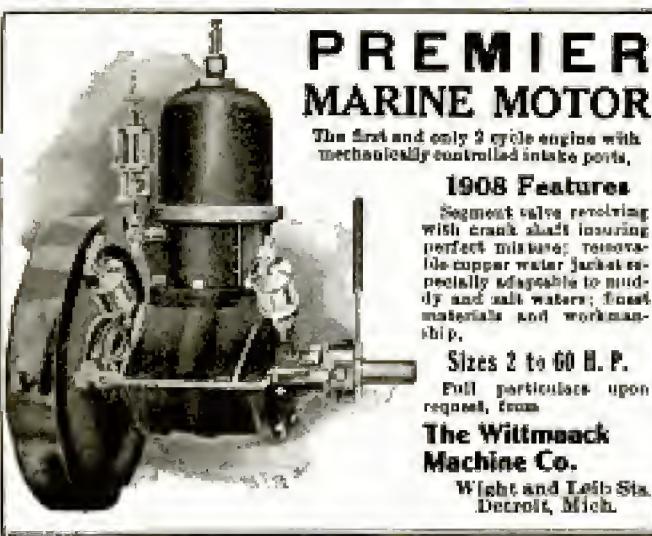
Segment valve reversing with crank shaft insuring perfect mixture, removable copper water jacket especially adaptable to muddy and salt waters; finest materials and workmanship.

Sizes 2 to 60 H.P.

Full particulars upon request, free.

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## FOX MOTORS

HIGH SPEED-HEAVY DUTY

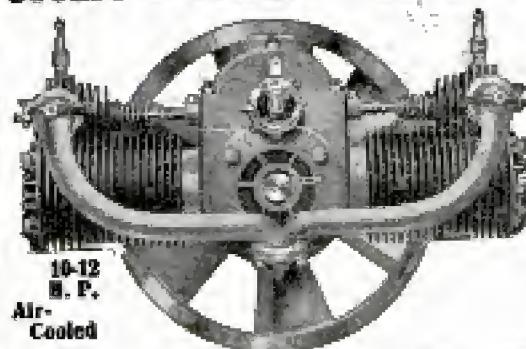
WE sell on the bore and stroke of our cylinders and their capacity in cubic inches. To realize the importance of this matter, send for our catalog.

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**SETS OF CASTINGS OF  
MODEL ENGINES**  
SEND 10¢ FOR 126 PAGE  
ILL. CATALOGUE.  
ALSO TOOLS,  
GEAR WHEELS & PARTS OF MODELS  
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# DeTamble Buggy-Type Engine

STURDY — COMPACT — RELIABLE — ECONOMICAL



10-12  
H. P.  
Air-  
Cooled

Fully warranted to keep cool and deliver the rated power. Perfectly balanced, — thoroughly high-grade. Weight, 150 lbs. Overall dimensions, length, 21½ in.; width, 10½ in.; and depth, including flywheel, 10½ in. Alternative prices: high-grade. Prompt deliveries.

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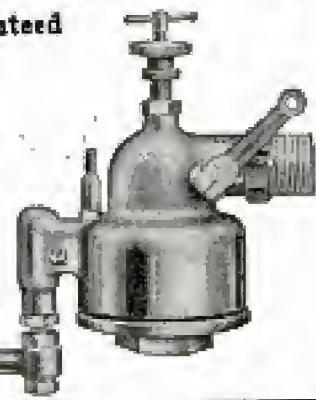
**SPEED CHANGING PULLEY COMPANY**  
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# Speed Carburetor

Positively Guaranteed

to develop greater power, speed, flexibility and economy in the engine than any other carburetor in the world, or purchase price refunded.

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(A Dynamo and Motor in One!) As a dynamo, it will light four 6-6. p. lamps easily; operate induction coils; charge storage batteries; decompose water, electrolyze, etc. As a motor, will operate sewing machine, jeweler's lathe, emery wheel, circular saw, advertising devices, and other useful appliances.

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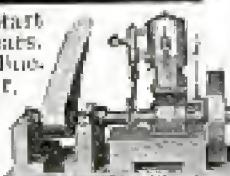
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SELLS LIKE SIXTY  
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For Pumping, Cream Separators, Churns, Wash Machines, etc. FREE TRIAL. Ask for catalog; all sizes

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1½ to 25 Horsepower; One, Two and Four Cylinders; Jump or Snap Spark Ignition; Two or Four Cycle. Send for Catalog.

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New Features, Better Engine, More Horse Power. Can be used for stationary work, 1½ H.P. \$48.50 complete. Special inducements to one Agent in each locality. Ask for catalog F.

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Complete Engine with  
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Strong, most powerful, efficient and reliable engine of its size on earth. Simple, compact, strong, durable, reliable, economical and safe. Any boat can install and run it. Dealer bound to 8 miles an hour. Sold from factory to user on 30 days' approval and 5-year guarantee. Prompt shipment. Order now!

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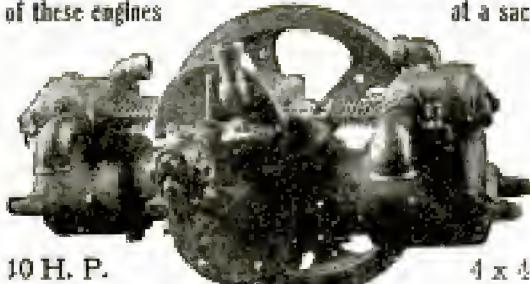
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100 of these engines

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10 H. P. 4 x 4

double opposed water cooled. BEST workmanship and material. With well as a lot with tools and patterns or simply. A Rare Chance to build your own auto or can be used as a stationary engine.

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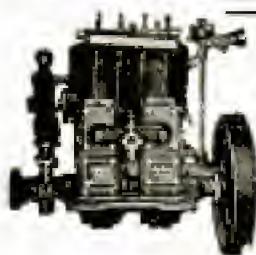
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That Start and Reverse on the Spark

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PORTABLE GASOLINE ENGINE  
2 H. P. Weight 40 lbs.

Can be instantly attached by two thumb screws to the transom of any row boat. Engine is air cooled. Just the engine for anglers and owners of dinghys and sail boats. Speed 5 to 7 miles per hour. For particular address

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Write Popular Mechanics.

## The CROSS CLUTCH

is a little better than any other now on the market and the price is no higher. Has been in use 14 years. Absolutely guaranteed for two years.

Immediate delivery. A GENTLEMAN WANTS TO BUY. Send for catalog.

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The World's Headquarters for Dynamos, Motors, Fans, Toys, Batteries, Bells, Bells, Lamps, Books. WE UNDERSELL ALL. WANT AGENTS

**PIKE'S PEAK PHOTOS FROM THE SKY.**—The manager of the Pike's Peak cog railway recently signed a contract with an eastern photographer to have three photographs of the peak taken from a balloon at a height of from 1,000 to 1,300 ft. above the summit.

The latest and perhaps the most interesting field of scientific photography is topography, or the making of photographs from a balloon or airship. This phase of the art is being steadily developed in spite of the difficulties, and a photographic outfit is now an essential part of an aeronaut's equipment.

First in importance is the part that topography takes in the solution of strategic questions, as, for instance, in the Russo-Japanese war. One of the most interesting topographical records ever made was that of Spelterini in his voyage over the Alps in a balloon.

According to the "Moving Picture World" a special field is open for the making of moving pictures from balloons. The time is not far distant when we will sit in our comfortable theatre chairs and follow the equations of a daring ride among the clouds. As the fields and houses grow smaller and smaller, we will recognize the earth, spread out like a map, but full of life and movement.

**THE TROUBLE WITH THE HOGS.**—A traveler passing through a thickly timbered rural district noticed in a clearing a number of hogs acting in a peculiar manner. They would start and run a hundred yards or so, stop and listen, then signal and run off in another direction. Noticing a cabin across the road, and a native sitting on the porch, he approached him on the subject. The following conversation took place:

Traveler—Say, mister, do you live here?

Native—I reckon I do.

Traveler—Do you own that bunch of hogs over in that clearing?

Native—I reckon I do. I raised them.

Traveler—Can you tell me what makes them pigs act so funny?

Native—Well, mister, I reckon I can. Whenever I wanted to feed them hogs, I used to whistle, and they would come up to the house, but lately I lost my teeth, and can't whistle any more, and now when I want to feed them I just knock on the corner of the house with this piece of wood, but them woodpeckers over there have just about got them hogs crazy.

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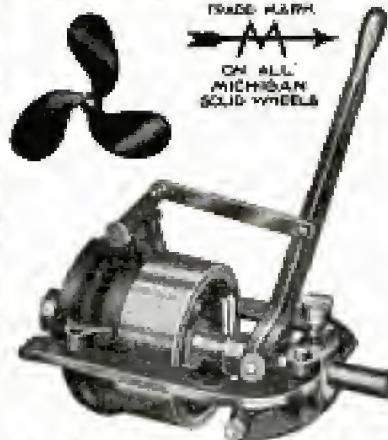
Thousands are in use all over the world. They are famous for their quality and speed, having won hundreds of races; they are now being used by over 800 engine builders.

Over \$100,000.00 worth of propeller wheels and reverse gear have been sold during 1908.

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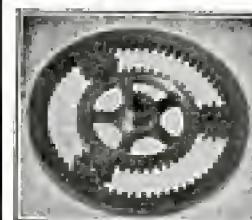
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Grand Rapids, Mich.



TRADE MARK  
ON ALL  
MICHIGAN  
SOLID WHEELS

### THE FAMOUS MICHIGAN REVERSE GEAR



## GEAR WHEELS

Spur  
Worm  
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OF

Steel  
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Cast Iron  
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"GRANT'S TREATISE ON GEARS" \$1.00  
**Philadelphia GEAR Works, Inc.**  
GEORGE B. GRANT, Pres. & M. E.

Philadelphia

## 16 Ft. Steel Launch with 2 H.P. Engine

complete  
\$96

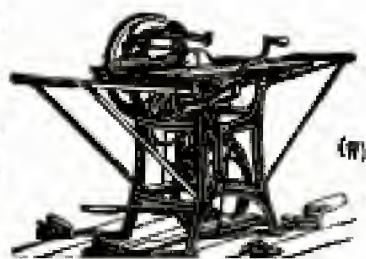
15-21-25 feet launches at proportionate prices. All launches fitted with 2-cycle marine engines with speed controlling lever; simplest engine made; starts without crank; 1000, 1200, only 3 moving parts. Steel hulls, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000, 2100, 2200, 2300, 2400, 2500, 2600, 2700, 2800, 2900, 3000, 3100, 3200, 3300, 3400, 3500, 3600, 3700, 3800, 3900, 4000, 4100, 4200, 4300, 4400, 4500, 4600, 4700, 4800, 4900, 5000, 5100, 5200, 5300, 5400, 5500, 5600, 5700, 5800, 5900, 6000, 6100, 6200, 6300, 6400, 6500, 6600, 6700, 6800, 6900, 7000, 7100, 7200, 7300, 7400, 7500, 7600, 7700, 7800, 7900, 8000, 8100, 8200, 8300, 8400, 8500, 8600, 8700, 8800, 8900, 9000, 9100, 9200, 9300, 9400, 9500, 9600, 9700, 9800, 9900, 10000, 10100, 10200, 10300, 10400, 10500, 10600, 10700, 10800, 10900, 11000, 11100, 11200, 11300, 11400, 11500, 11600, 11700, 11800, 11900, 12000, 12100, 12200, 12300, 12400, 12500, 12600, 12700, 12800, 12900, 13000, 13100, 13200, 13300, 13400, 13500, 13600, 13700, 13800, 13900, 14000, 14100, 14200, 14300, 14400, 14500, 14600, 14700, 14800, 14900, 15000, 15100, 15200, 15300, 15400, 15500, 15600, 15700, 15800, 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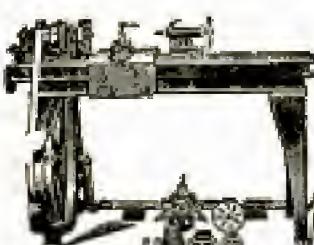
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**ORIGIN AND USE OF WATERMARKS.**—The discovery of the watermark was the result of an accident—probably a thousand years ago. Parchment was then made of vegetable pulp, which was poured in a liquid state into a sieve; the water dripped out from below, and the thin layer of pulp that remained was pressed and dried. When dry it was found to bear upon it the marks of the fibers that composed the bottom of the sieve.

These fibers seem to have been twisted reeds, and the mark they left on the parchment took the form of wide lines running across and across diagonally. In those days the watermark was regarded as a blemish, since the fiber was thick and coarse, and the deep impression made on the paper proved a drawback in writing. The quill of the scribe found many a fawning gap to cross on the surface of the manuscript—"switchback scripture" it has been termed. But when wire was substituted for fiber in the sieve, the lines of the watermark grew thinner and less conspicuous.

The possibilities of the usefulness of the watermark became apparent by degrees. It was first found to be of service in preventing the forgery of books and manuscripts; many a bogus copy of a rare work has been detected because the counterfeit failed to take into account the watermark of the original. The watermark of many a precious manuscript in the world's museums is alike its glory and its safeguard. And in the sphere of bank notes and paper money everywhere the watermark is most useful in protecting the notes from imitation.

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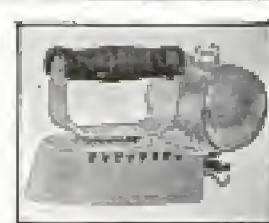
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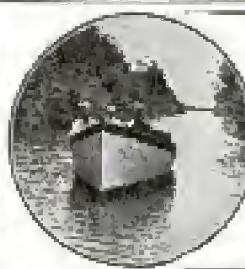
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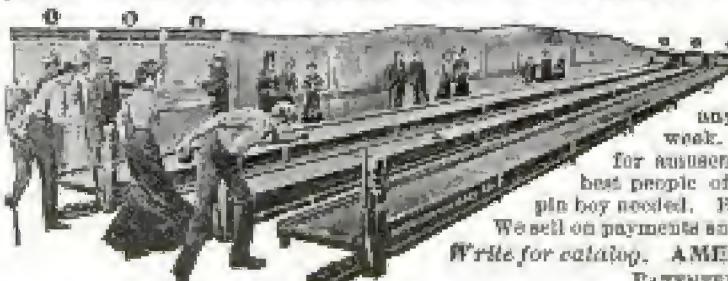


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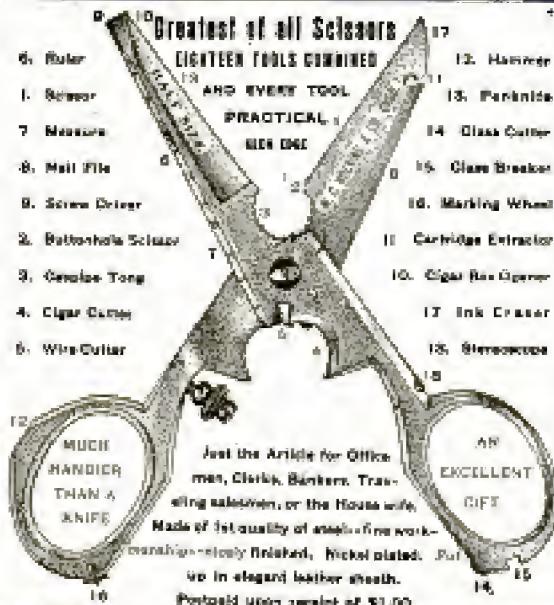
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"How much is it?" he asked when he had looked it over.

"I can't sell it to you," the dealer replied, "but I will lease it to you for 50 years for \$15."

"This is a dad-blamed funny kind of a joint," the cowboy said, "I don't want to lease a gun; I want to own it."

He started to walk out, but was called back by the dealer, who patiently explained that the last legislature of Texas had passed a law which imposes a tax of 50 per cent on the gross proceeds from the sale of pistols.

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"Get jayed?"

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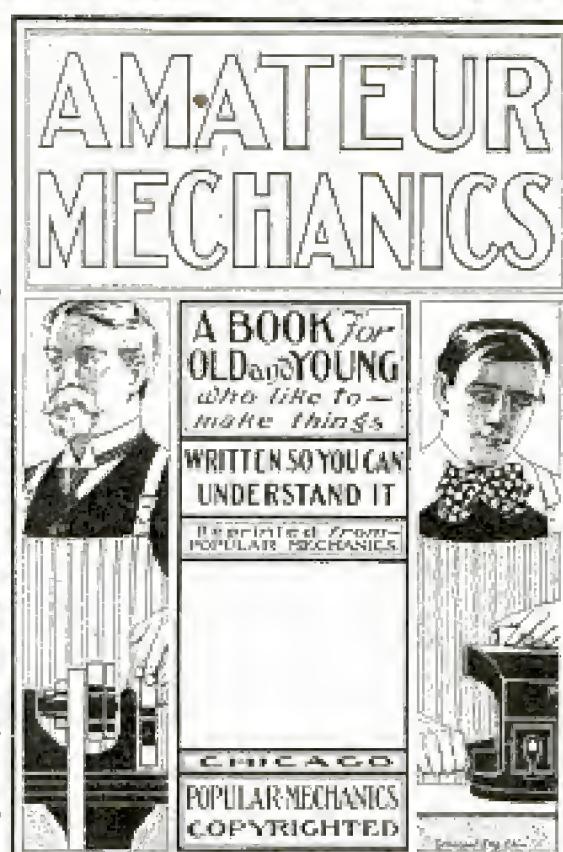
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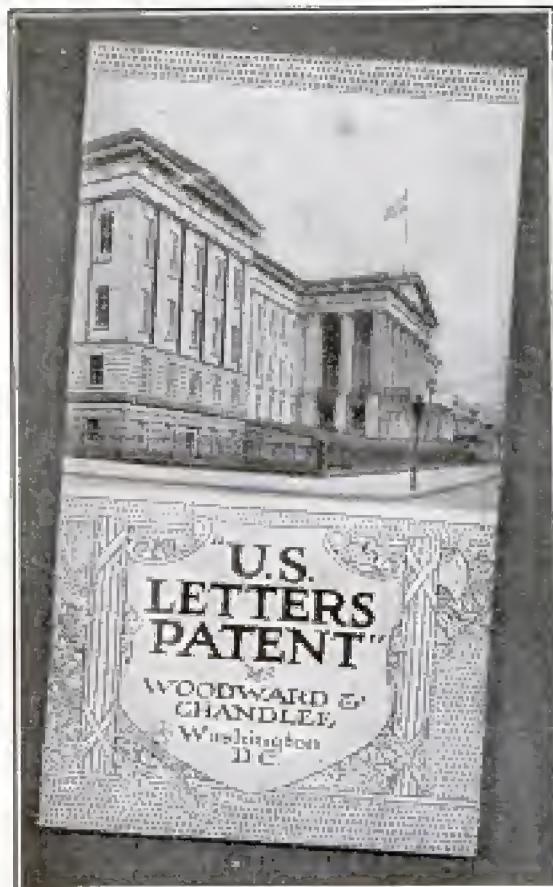
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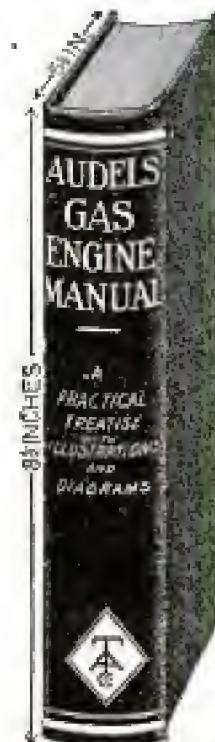
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(Continued from page 126.)

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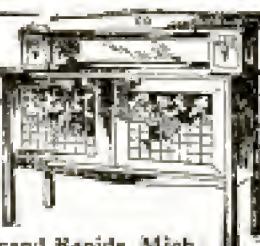
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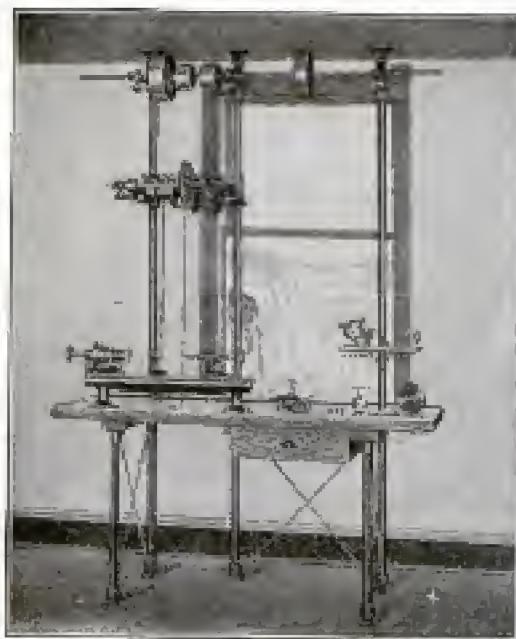
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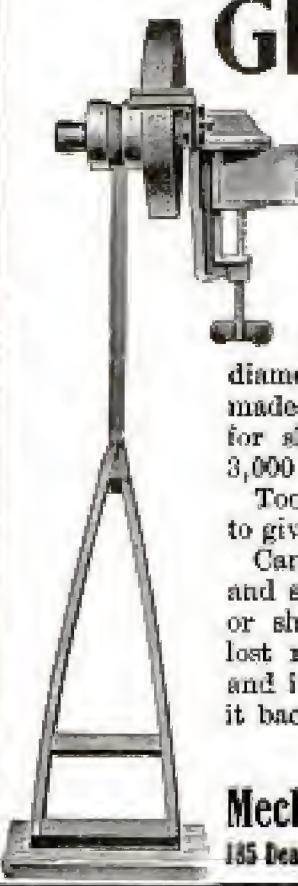


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The report of the officials of the association for the first week, according to a Japanese paper, indicated that the scheme was then working satisfactorily and that the export to China would be three times as great as in the year previous.

In the meantime, Shanghai's municipal council took action. At a meeting of the city fathers a resolution was adopted indicating that any attempt to sell bales of cotton containing lottery tickets would be interpreted as a breach of the regulations prohibiting the sale of lottery tickets in Shanghai and directed the police to enforce the ordinance in this regard.—Great Eastern Review.

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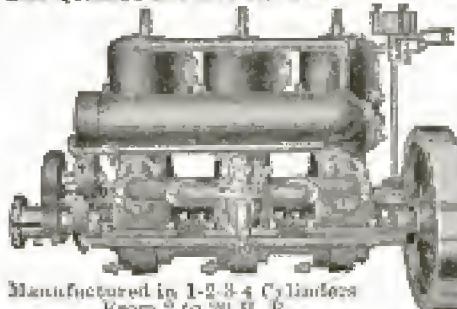
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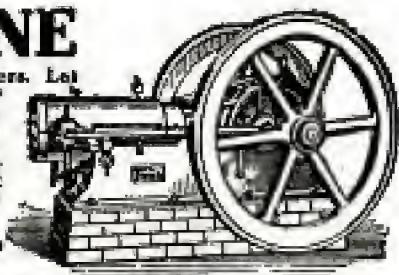
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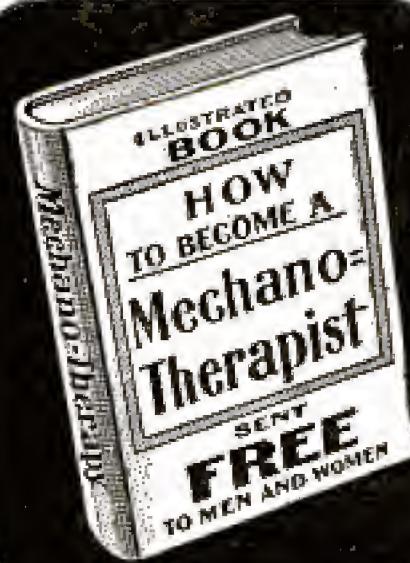


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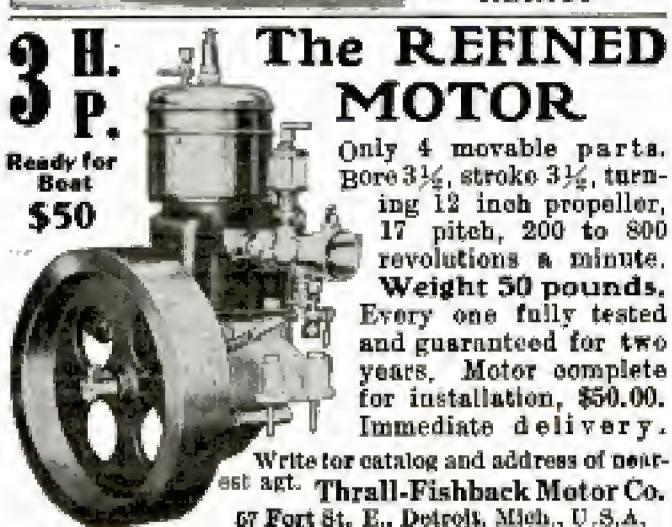


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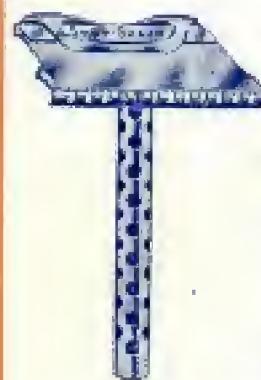
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